THE NATURAL HISTORY



OF BRITISH BUTTERFLIES & MOTHS

EDWARD NEWMAN, F.L.S., F.Z.S., &c.

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BRITISH
BUTTERFLIES AND MOTHS.

AN

ILLUSTRATED NATURAL HISTORY OF

BRITISH

BUTTERFLIES AND MOTHS.

BY

EDWARD NEWMAN, F.L.S. F.Z.S.

THE FIGURES

DRAWN BY GEORGE WILLIS,

AND

ENGRAVED BY JOHN KIRCHNER.



HEATH FRITILLARY (*Melitæa Athalia*).

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PREFACE.

MY WORK is completed. I am bound to commend it to the "benevolent reader" in the good old-fashioned, time-honoured style. Fettered by usage, equally old-fashioned, equally time-honoured, I am induced to place this commendation in front, although I entirely agree with the sentiment that has induced some writers truthfully to place their preface as written, at the end, when all the rest was complete. This act of authorship is generally regarded as facetious—a very mild joke certainly, but a joke nevertheless. I cannot understand this: I cannot perceive why an author should be ashamed or afraid to make the public confession that his valedictory address was given forth after his long companionship with the reader had ceased. I cannot conceive why such an obvious truism should be thought droll. Be this as it may, one thing is certain: an author is held to be something less than courteous who does not commend his labours to the public in some way or other, even though he may have nothing to say by way of commendation: so I bow to custom and commence my task. Would that I could adopt the stereo-form of prefaces, and plead the pressing solicitations of a large circle of admiring friends as the lever that enforced publication; but I feel that such a plea would be untruthful. I have been submitted to no such pressure: I have been lifted out of my normal obscurity by no such lever. Friends such as these have held aloof in the coolest and most unconcerned manner. I am left without excuse.

First, then, I would invite attention to the fact, again noticed farther on, that I had a very, very early predilection for Butterflies—I may say even from my nurse's arms—and this taste having continued to old age, and having been indulged whenever opportunity offered, I have seen more of the little world of English Butterflies than most of my compatriots. I have become familiar with Silvery Queens and High Browns; have chased Dark Greens on the treacherous slopes of Cwm Elan; have revelled and rioted amongst thousands of Glanvilles on the Undercliff, where that admirable and determined squatter not only established itself in prehistoric times, but maintains its ground, and multiplies exceedingly; I have made the White C my especial game; I have taken *Io* from her favourite thistles and teasels, have watched the Purple Emperor soaring above the oaks at Darent, and have wondered why he should seek realms unknown to his lady-love, his empress-queen; and I have wondered still more why a creature so gloriously refulgent with purple, should condescend to feed on filth and putrefaction, instead of feasting on ambrosial pollen and quaffing nectar, with Flora for his cup-bearer; I have chased *Acis* with unusual success, and have mourned over his depa[illegible]re from the ancient dwelling-place where

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Galathæa, his deserted love, still lingers, clothed in her widow's weeds; but of all the tribe of flying flowers—

"It flies, and seems a flower that floats on air,"

as saith Philip de Commine—Dian's nymph, *Hyale*, has led me the merriest dance among the blooming lucerne: it was where the Croydon rail now intersects those Surrey hills which constitute the first glimpse of country as we emerge from the fuliginous sea of London habitations: it was here, in market-gardens forbidden to the public, that I made her acquaintance. Here were employed a multitude of female Hibernians in the healthful pursuit of horticulture. On one occasion my quarry led me into their midst, when lo! they abandoned their occupation, and pursued me with the very same energy that I was wasting on the yellow-robed nymph; the scene must have been an exciting one, and would have reminded a classical spectator of Meleager, or Orestes, or Œdipus pursued by the Furies: alas! the resemblance to Œdipus is greater now!

It may be reasonably required that one so practised in these "pursuits" should impart to others some of the knowledge which he must himself have acquired in this branch of the gentle art of venerie, especially as regards the acquisition of extreme rarities: I can only regret that I have so little to impart. There are three modes in which rarities may be obtained:—*First*, by accident; the most careless and unobservant of beginners may receive an unexpected visit from *Antiopa* or *Lathonia*; the stranger may settle in his father's garden, and gladden his eyes without any reason, without any plausible excuse, and *may* fall a victim to the most bungling manipulation of that clumsy implement, the ordinary chimney-pot covering to which Englishmen cling as a respectable and becoming head-gear. *Secondly*, by diligently studying the localities; *Cinxia* is to be found with certainty on the Undercliff, *Epiphron* on the mountain wilds of Cumberland, *Typhon* on the mosses of Lancashire, *Arion* on the sedgy slopes of Devon and the Cotswolds, *Artaxerxes* on Arthur's Seat, and so with many others. *Thirdly*, by purchase; *Lathonia*, *Niobe*, *Antiopa*, *Daplidice* are to be purchased in abundance at 1d., 2d., or 3d. each, neither species being uncommon on the Continent: supposing the purchaser to be fastidious as to his collection being purely British, he may obtain a warranty with any individual specimen he is selecting, by paying twenty or thirty shillings additional: the specimen then becomes "British," just as a wealthy tradesman becomes an esquire by paying for armorial bearings which some ingenious manufacturer professes to "find" in the Heralds' College. I prefer dispensing with warranty as too expensive a luxury; and although I admit the truth of Butler's familiar couplet, showing that

"*Some say* the pleasure is as great
In being cheated as to cheat,"

still the pursuit of pleasure, however keen, must stop somewhere, and with me

it has always stopped short of purchasing a British *Lathonia*; and I emphatically recommend all beginners either to procure European specimens for *pence*, and mark them carefully as foreign, or wait patiently for the chance advent of a British specimen. All scholars will recollect the interdict laid by Juno on Latona—an interdict that seems to be still rigidly enforced on British soil: she has no resting-place here. As applicable to this branch of my subject, I may perhaps be allowed to introduce the profound and truthful observation that "angels' visits are few and far between"; this observation may or may not be original: I am not altogether free from an impression that I have seen it in print. But this is exactly the case with *Lathonia's* visits, and also with those of *Antiopa*. The Queen of Amazons will favour us now and then, but always without rule and without notice: nothing can be more capricious than her conduct. She will sometimes vouchsafe an appearance on a heaven-kissing hill, sometimes on a desert plain; sometimes she will settle in one of those roadways which intersect the thickest forestry; sometimes she may be seen basking on the cossus-eaten trunk of a pollard willow overhanging a river's brim; sometimes even in a walled garden, imbibing the luscious juices of a fallen plum; but always regardless of degrees of latitude or longitude, or the laws of altitude, or the conditions of atmosphere and soil: to these she has never acknowledged fealty or declared herself amenable.

Need I give any instruction how to catch the common Butterflies? In France, in Switzerland, almost every educated boy or girl is far more accomplished in this art than I: their instrument is simply a bag of green muslin or gauze thirty inches deep, twelve inches wide on the top, and tapering almost to a point at the bottom; round the top there must be a hem of brown holland, and a cane or wire in the form of a ring must be run through the hem and form a hoop, the lighter the better: the hoop must then be fastened by means of a ferule, or a screw, or any other simple contrivance, to the top of a walking-stick, and then the implement is complete. Such a net can be bought at any shop in London where insects are sold; for instance, at Ashmead's in Bishopsgate Street, Gardener's in Holborn, Cooke's in New Oxford Street, and a great many others; the same tradesmen will also supply you with suitable pins to pin your Butterflies, and with pocket boxes in which to place them when pinned. I cannot strongly recommend articles that are made rather for sale than for use; but it is necessary to buy in the first instance, and very soon you will get into the way of making the apparatus for yourself, and making it to your own taste and of durable materials. It is very difficult to lay down any rule on the subject of making nets, so I give this advice to purchase in the first instance, that you may gain a preliminary idea of what to use; practice and experience will teach you everything in the course of a few months, and there are no lessons so good or so perfectly remembered as those which practice and experience teach.

But there is another and a better way to obtain Butterflies. I have fully explained, in the Introduction which follows, that a Butterfly was not always a Butterfly, but was

"Once a worm, a thing that crept
On the bare earth, then wrought a tomb and slept."

In this state of worm or caterpillar, Butterflies of many kinds are most easy to obtain: to my notion, an umbrella and a walking-stick are the best implements. Spread the umbrella; turn it upside down; hold it under a shrub, a bunch of nettles, or the bough of a tree: thrash the foliage with your walking-stick, and caterpillars without number will fall into the umbrella: pick them up, put them in tin boxes, and take them home. They will not all produce Butterflies; many of them moths; but whether caterpillars of moths or Butterflies, they are all worth keeping. "Caterpillars being mostly eaters of vegetable matter, there is no difficulty in providing and renewing the plants upon which they feed. A garden pot, half filled with loose, sandy earth, with a few pieces of cane bent over, and the ends inserted in the pot; this frame covered with gauze, and a string passed over it below the mouth of the pot, forms a very good cage for caterpillars. A slip of the food-plant should be first placed in a phial of water and put in the centre of the cage, which should be kept in a shady place. According to the size of the caterpillars, and the heat of the weather, the food will require to be renewed from time to time." These instructions are copied from the "World of Insects, by J. W. Douglas," and others, more minute, elaborate, and complete, will be found in that excellent little book, "The Insect-Hunter's Companion," by the Rev. Joseph Greene. I would most willingly quote pages from this last-named work, which is published by Mr. Van Voorst at 1s. 6d.; but I imagine that every collector of insects must of necessity purchase the book itself, and it would be useless to possess the same information in two forms.

Treated in accordance with Mr. Greene's instructions, and carefully watched from time to time, the caterpillar will soon grow to its full size, will fix itself to the pot, the muslin, the leaves, or the twigs, and then turn to a chrysalis, and subsequently to a Butterfly, in the manner which I have fully described at page 14.

There is another very curious circumstance which attends the birth of a Butterfly—a circumstance that has been noticed by all naturalists and in all ages. This is so well described in that inimitable work, Kirby and Spence's "Introduction to Entomology," that I shall quote their description as being better than anything I can write myself:—

"Many species of Butterflies, when they emerge from the chrysalis state, discharge a reddish fluid, which in some instances, where their numbers have been considerable, has produced the appearance of a shower of blood; and by this natural fact, all those bloody showers recorded by historians as preternatural, and regarded where

they happened as fearful prognostics of impending evils, are stripped of their terrors, and reduced to the class of events that happen in the common course of nature. That insects are the cause of these showers is no recent discovery, for Sleidan relates that in the year 1553 a vast multitude of Butterflies swarmed through a great part of Germany, and sprinkled plants, leaves, buildings, clothes, and men, with bloody drops, as if it had rained blood. But the most interesting account of an event of this kind is given by Reaumur, from whom we learn that in the beginning of July, 1608, the suburbs of Aix, and a considerable extent of country round it, were covered with what appeared to be a shower of blood. We may conceive the amazement and stupor of the populace upon such a discovery, the alarm of the citizens, the grave reasonings of the learned. All agreed, however, in attributing this appearance to the powers of darkness, and in regarding it as the prognostic and precursor of some direful misfortune about to befall them. Fear and prejudice would have taken deep root upon this occasion, and might have produced fatal effects upon some weak minds, had not Mr. Peiresc, a celebrated philosopher of that place, paid attention to insects. A chrysalis which he preserved in his cabinet let him into the secret of this mysterious shower. Hearing a fluttering, which informed him his insect was arrived at its perfect state, he opened the box in which he kept it. The animal flew out, and left behind it a red spot. He compared this with the spots of the bloody shower, and found they were alike. At the same time he observed there was a prodigious quantity of Butterflies flying about, and that the drops of the miraculous rain were not to be found upon the tiles, nor even upon the upper surface of the stones, but chiefly in cavities and places where rain could not easily come. Thus did this judicious observer dispel the ignorant fears and terror which a natural phenomenon had caused."

To return to my more immediate subject. Having now obtained your Butterfly, you must proceed to kill it for preservation, unless indeed you find it is one you already possess, and then, by all manner of means, allow it to escape. It will indeed be a pleasure to see your captive essay the powers of his newly-acquired wings, and launch himself for the first time on "the realms of air." But suppose you wish to preserve it, then, alas! it must die. Butterflies require to be pinned: the pin is passed through the very centre of the thorax, or that part to which the wings are attached, the finger and thumb of the left hand at the same time pinching the insect under the wings. A slight pinch numbs a Butterfly; and immediately it is pinned it must be put in the collecting box, in which a little bag of camphor or of chopped laurel leaves must always be kept. The object of this is to prevent the return of life, for, curious as it may seem, a Butterfly, after appearing to be dead, will frequently be seen to move, and this for hours. Now, it is not only cruel to keep any living thing in such a semi-animate condition, but it is very unwise, for it will be sure to

injure itself by knocking off the delicate scales with which its wings are adorned. In the second volume of the "Entomological Magazine" the late Mr. Stephens gives some excellent instruction as to the manner of using the laurel leaves. It is as follows:—"Take three or four juicy leaves, the younger the better, with, if a more powerful effect is required, a small portion of the tip of the stalk of the common laurel, break or cut them into small pieces, and crush them quickly between two stones, in a thin piece of paper, screw up the produce in the latter, with as little exposure to the air as can be managed, and fix the mass by a pin in the corner of the collecting box, in which the living insects are to be previously placed; keep the box closely shut, and in about five minutes every specimen will have expired. It is necessary that the external air should be excluded, otherwise the fumes of prussic acid which are evolved from the crushed leaves will become too much attenuated to affect the respiratory organs of the insects, and the latter will partially revive if too speedily exposed to the vivifying influence of a purer atmosphere."

Now, then, your Butterflies being caught and killed, the next process is to "set" them, by which I mean to place them in the position in which they are to remain. For the purpose of "setting" insects, corked boards are prepared and sold by hundreds, and may be obtained of the dealers already mentioned. These boards have grooves in them of a variety of sizes adapted to admit the body of any Butterfly or moth; the body being placed in this groove, the wings have to be strapped down with card. You must cut a common card—any visitor's or tradesman's card will answer the purpose—in little strips; lay one of the strips on the two wings on one side of the Butterfly, and another strip on the two wings on the other side, and pinning down the ends of both strips, the wings will remain exactly in the position in which you place them. A word as to that position: let the wings be so arranged that the markings on all four wings shall be distinctly visible. You can have no better rule on this subject than to imitate exactly the position in which Mr. Willis has placed them in the beautiful figures he has drawn to illustrate this history. If you only continue to follow carefully the positions he has drawn, you will succeed to admiration. Arrange your setting-boards in what is called a drying cage—that is, a box with grooves along the sides in which the setting-boards can slide easily. There must be a window of perforated zinc or gauze wire at both ends of this drying cage, so that the air may pass freely through, whilst the mice, cockroaches, and wasps are kept out. Woe to the Butterfly that is attacked by either of these enemies! It is curious that three animals, that are not very likely to eat Butterflies and moths in a state of nature, should prefer them, when the entomologist has prepared them for his cabinet, to every other kind of food, however delicious. I call it a depraved taste; depraved, indeed, it certainly is, for how can these

creatures reconcile this conduct with the laws of morality and honesty? But even for that most detested of all creatures, the cockroach, I can add a word of praise. There is nothing new under the sun, so says the proverb. I believed, until a few years back, that I possessed the knowledge of a fact in the dietetic economy of the cockroach of which entomologists were not cognizant, but I find myself forestalled; the fact is as old as the hills; it is that the cockroach seeks with diligence, and devours with great gusto, the common bed-bug. I will not mention names, but I am so confident of the veracity of the narrator that I willingly take the entire responsibility. "Poverty makes one acquainted with strange bedfellows," and my informer bears willing testimony to the truth of the adage: he had not been prosperous, and had sought shelter in a London boarding-house: every night he saw cockroaches ascending his bed-curtains; every morning he complained to his very respectable landlady, and invariably received the comforting assurance that there was not a "black beetle" or a bug in the house, and if he *had* seen such a thing, he must have brought it to the house in his clothes: still he pursued his nocturnal investigations, and he not only saw cockroaches running along the tester of the bed, but, to his great astonishment, he positively observed one of them seize a bug, and he therefore concluded, and not without some show of reason, that the cockroaches ascended the curtains with this especial object, and that the minor and more odoriferous insect is a favourite food of the major one. The following extract from Webster's "Narrative of Foster's Voyage" corroborates this recent observation, and illustrates the proverb which I have taken as my text. "Cockroaches, those nuisances to ships, are plentiful at St. Helena; and yet, bad as they are, they are more endurable than bugs. Previous to our arrival here in the 'Chanticleer' we had suffered great inconvenience from the latter, but the cockroaches no sooner made their appearance than the bugs entirely disappeared; the fact is, that the cockroach preys on them, and leaves no sign or vestige of where they have been: so far it is a most valuable insect." Whether this "word for the cockroach" will reconcile housekeepers to its presence is doubtful; no one likes to acknowledge the existence in his house of "the minor and more odoriferous insect," and the axiom that "the greater includes the less" might here also prove true.

However, let us suppose that the Butterflies on the setting-boards have fairly escaped the mice, the wasps, and the cockroaches, and have thoroughly dried, and are quite fit to remove—I recommend that they be left at least ten days—then comes the question, the very important question, of what to do with them. Of course, they must be removed to a cabinet, about which I have a good deal to say. A well-made cabinet is of the greatest importance, and is not to be obtained without some difficulty and expense. Every cabinet-maker will at once take your order; but an habitual tradesman-like acumen will prevent his doing

you justice. Many parts of the cabinet are not visible from the exterior, and it is almost impossible to persuade a tradesman to use good and seasoned wood for those parts which are not exposed to sight. It is therefore absolutely necessary to inspect the work while in progress, to examine the wood, and ascertain that it is thoroughly seasoned; if the wood retains any sap it is of no use, as it invariably warps, and thus prevents the drawers from moving, and the cabinet becomes useless. Nothing but the best mahogany must be used: a great variety of wood has been tried, particularly a kind of resinous cedar, which has a colour and a grain much resembling mahogany, but which is far worse for cabinets than the most resinous deal; after the cabinet has been a short time built, it will become saturated with resin, and all the insects it contains will be speedily spoiled. Other cheap woods are also much in use, and are veneered in front with mahogany, and the parts which are exposed on taking out a drawer, are smeared over with a brownish composition, to keep up the deception. A cabinet should consist of two tiers of drawers, fifteen or twenty in each tier: if the number be fifteen only, there is abundance of room for a book-case to stand above them, which is not only convenient, but has an agreeable effect. The drawers should be enclosed in front by folding doors, all the edges of which must be carefully covered with velvet; by this precaution dust is effectually excluded. Each drawer should be from fifteen to eighteen inches square and two inches deep, and should be covered with thin slices of very soft cork; these slices are glued together at the edges, and fastened to the bottom of the drawer by small tacks and glue, the tacks, or rather brads, being without heads. When the cork is secured, its surface must be made perfectly smooth, by rubbing it with pumice-stone, and the whole is then neatly covered with white paper, the paper being pasted on the cork. It will be found that the cork permits the pin on which an insect is placed to pass into it with the greatest facility, and yet is sufficiently elastic to retain it steadily in its place. Each drawer must be covered by a pane of the best flatted glass, carefully fixed with putty in a square frame, and the frame nicely fitted to the drawer, thus insuring the exclusion of any dust that may have passed the folding doors.

A cabinet made on this plan is, of course, very expensive: it is out of the question to get a cheap one; the materials are dear, and the cost of putting them together is very great, and there are few, very few, cabinet-makers who understand it. I have seen the cabinets made by three only. The price of a cabinet thoroughly well made is a guinea a drawer: it is worth no man's while to make one for less. It seems, and indeed it is, a great deal of money, but the real test of the matter is, "Will anyone make it for less?" and it is a fact worthy of consideration that really well-made cabinets, when sold second-hand by Mr. J. C. Stevens, of King Street, realise the original cost, or very nearly so, and sometimes even more; so that a really good insect cabinet is something

like a safe investment of money, the interest being paid in the pleasure and profit the owner receives from studying the contents.

As soon as the cabinet is quite ready to receive the Butterflies, you must cut up a copy of Doubleday's "List of British Butterflies and Moths" very neatly with a pair of scissors, thus making a quantity of little labels. You will observe that every insect has two names, as *Argynnis Paphia:* the first name must be pinned above the insect, the second below, thus:—

ARGYNNIS.

(The Butterfly comes in this space.)

PAPHIA.

Then follows the next Butterfly, with its scientific name above and below, then the next, and so on until the row is complete. One drawer will accommodate six or seven rows of Butterflies. It is a very common plan with entomologists to rule on the paper straight lines, either in pencil or ink, between the rows; the idea is that they serve as guides to the eye in keeping the rows perfectly parallel; but a collection, as the number of insects increases, has to be re-arranged every few years, and then these lines have to be rubbed out, or obliterated in some way—perhaps by papering the drawers anew. This, I found, caused a great deal of unnecessary trouble, and therefore I have entirely abandoned the plan, and now manage to dispense with lines altogether.

Even after all your insects are arranged in the neatest manner, and you fancy that everything is going on well, you will often find that you have included in your carefully-glazed drawers insects that you had no desire whatever to preserve. Their presence will be indicated by coarse dust beneath your choicest specimens, and you will often see holes made in the wings, and all manner of disfigurement and damage. The enemies are of three kinds—the caterpillar of a beetle called *Attagenus Pellio;* the caterpillar of the clothes-moth, *Tinea pseudo-spretella;* and a nimble little fellow, called *Atropos pulsatorius.* Their united depredations would very speedily reduce your collection to a mass of dust and fragments; but never let the mischief come to such a pass as that. Directly you observe any dust, however little, underneath an insect, take off the glass, and take out the infected individual; as soon as he is removed from the drawer, drop benzole on his back, drop after drop, until he is thoroughly saturated, and all his wings are rendered perfectly transparent. In this state remove him to the drying cage, and there let him remain until all the benzole has evaporated, and his colours have returned, bright and beautiful as ever. You may be sure the creatures that were devouring him are all dead, and you have nothing further to fear from them. My own drawers are looked at so frequently, and the benzole is applied so continually, that marauders of this kind never

venture to show even their noses amongst my treasures; and I should be almost as much astonished to find a living destroyer as a living Emperor Butterfly in one of my drawers.

And now it only remains for me to mention my obligation to those gentlemen who have given me such cordial and constant assistance during the progress of my little work through the press: to all of them I offer my most sincere thanks. I cannot mention each individual by name, for the list would include everyone known as a collector of our British Butterflies, but I will select them to whom I am more especially indebted: and first, my valued friend and constant adviser, Mr. Doubleday. Every page has passed under his eye, and now incorporates his invaluable corrections. The incalculable importance of this supervision everyone will admit. Next, Mr. Bond. This generous and well-known naturalist placed his entire collection at my disposal: he considered nothing too good or too valuable to entrust to my care; and thus I have been enabled to figure varieties which exist only in his magnificent collection. Mr. Dale has been indefatigable in supplying dates and localities: there is not a species of any variety but has received some addition to its history from the stores of his unequalled information. Mr. Birchall, with his accustomed kindness, has done all in his power to promote my undertaking.

These, our leading Lepidoptirists, men of European reputation, claim individual thanks. But it must not be supposed that I undervalue in the slightest degree those less distinguished, but no less kind and energetic workers, who have supplied me with caterpillars for description, and with county lists of localities where Butterflies are to be found. Without such assistance this work would not have been what it is; nor would it have attained, while in progress, a sale which I believe is without equal in any branch of science.



Erebia Ligea.

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Thecla Pruni, with the wings closed.

THE

ILLUSTRATED NATURAL HISTORY

OF

BRITISH BUTTERFLIES.

BY

EDWARD NEWMAN, F.L.S., F.Z.S., &c.



Papilio Podalirius recorded as British by Haworth, but no British specimen is known.

PRELUDE OF MOTTOES.

Child of the sun, pursue thy rapturous flight,
Mingling with her thou lov'st, in fields of light;
And where the flowers of Paradise unfold,
Quaff fragrant nectar from their cups of gold.
There shall thy wings, rich as an evening sky,
Expand and shut with silent ecstasy.
Yet wert thou once a worm, a thing that crept
On the base earth, then wrought a tomb and slept.
And such is man; soon from his cell of clay
To burst a seraph in the blaze of day.

ROGERS.

Who loves not the gay butterfly, which flits
Before him in the ardent noon array'd
In crimson, azure, emerald, and gold;
With more magnificence upon his wing—
His little wing—than ever graced the robe
Gorgeous of royalty; is like the kine
That wanders 'mid the flowers that gem the mead,
Unconscious of their beauty.

CARRINGTON.

Behold again, with saffron wing superb,
The giddy butterfly. Released at length
From his warm winter cell, he mounts on high,
No longer reptile, but endowed with plumes,
And through the blue air wanders; pert, alights,
And seems to sleep, but from the treacherous hand
Snatches his beauties suddenly away
And zigzag dances o'er the flowery dell.

HURDIS.

Late, as I wandered o'er a verdant meadow,
Loathsome and hairy creatures were devouring
Every leaf that tempted with its greenness,
Or by its fragrance.
Great was their toiling, earnest their contention,
Piercing their hunger, savage the dissension,
Selfish their striving, hideous their bearing,
Ugly their figure.
Next day I wandered to the verdant meadow;
Each worm was spinning for himself a mantle;
It was his grave-shroud; and I watched him closely
Wrap it around him.
Once more I wandered by the verdant meadow;
Each worm was bursting from his long confinement;
Each one was spreading to the sun's bright beaming,
Quivering pinions.
Hued like a rainbow, sparkling as a dewdrop,
Glittering as gold, and lively as a swallow,
Each left his grave-shroud, and in rapture winged him
Up to the heavens.
Oh! then, shall man, on earth condemned to trouble,
Toilsome existence, warfare with his kindred,
Build for himself his last cold habitation,
Doomed to remain there?
No; like these creatures, trouble, toil, and prison
Chequer his pathway to a bright hereafter
When he shall mount him to the happy regions
Made to receive him.

ANON.

Frail feeble sprites!—the children of a dream!
* * * *
Like motes dependent in the sunny beam,
Living but in the sun's indulgent ken,
And when that light withdraws, withdrawing then;—
So do we flutter in the glance of youth
And fervid fancy,—and so perish when
The eye of faith grows aged.

HOOD.

These be the pretty genii of the flowers,
Daintly fed with honey and pure dew.

HOOD.

Their wings with azure, green, and purple gloss'd,
Studded with colour'd eyes, with gems embossed,
Inlaid with pearl, and marked with various stains
Of lively crimson through their dusky veins.—

MRS. BARBAULD.

Lo, the bright train their radiant wings unfold
With silver fringed, and freckled o'er with gold.
On the gay bosom of some fragrant flower,
They idly fluttering live their little hour;
Their life all pleasure, and their task all play,
All spring their age, and sunshine all their day.

MRS. BARBAULD.

As, rising on its purple wing,
The insect queen of Eastern spring
O'er emerald meadows of Kashmere
Invites the young pursuer near,
And leads him on from flower to flower
A weary chase and wasted hour;
Then leaves him, as it soars on high,
With panting heart and tearful eye.
* * * *
The lovely toy so fiercely sought
Has lost its charm by being caught,
For every touch that wooed its stay
Has brushed its brightest hues away.

BYRON.

Voyez ce papillon échappé du tombeau,
Sa mort fut un sommeil, et sa tombe un berceau;
Il brise le fourreau qui l'enchainait dans l'ombre;
Deux yeux paraient son front, et ses yeux sont sans nombre;
Il se tranait à peine, il part comme l'éclair;
Il rampait sur la terre, il voltige dans l'air.

DE LILLE.

Round about doth flie,
From bed to bed, from one to t'other border;
And take survey with curious busy eye,
Of every flower and herbe there set in order.
Now this, now that, he tasteth tenderly,
Yet none of them he rudely doth disorder.
Ne with his feete their silken leaves deface
But pastures on the pleasures of each place.

And evermore, with most varietie
And change of sweetness (for all change is sweet),
He casts his glutton sense to satisfie,
Now sucking of the sap of herbe most meet
Or of the dew, which yet on them doth lie
Now in the same bathing his tender feet:
And then he percheth on some branch thereby,
To neatten him, and his moist wings to dry.

And whatso else of virtue good or ill
Grew in the garden, fetched from far away
Of every one he takes and tastes at will;
And on their pleasures greedily doth prey
That when he hath both plaied and fed at fill
In the warme sunne he doth himself embay,
And then him rests in riotous suffisaunce
Of all his gladfulness and kingly joyance.

What more felicitie can fall to creature
Than to enjoy delight with libertie
And to be lord of all the works of Nature?
To reign in the aire from the earth to highest skie,
To feed on flowers, and weedes of glorious feature?
To take whatever thing doth please the eye?
Who rests not pleased with such happiness
Well worthy he to taste of wretchedness.

SPENSER.

The helpless crawling caterpiller trace,
From the first period of his reptile race.
Cloth'd in dishonour, on the leafy spray
Unseen he wears his silent hours away;
Till satiate grown of all that life supplies,
Self-taught, the voluntary martyr dies.
Deep under earth his darkening course he bends.
And to the tomb, a willing guest, descends.
There, long secluded, in his lonely cell,
Forgets the sun, and bids the world farewell.
O'er the wide wastes the wintry tempests reign,
And driving snows usurp the frozen plain:
In vain the tempest beats, the whirlwind blows;
No storms can violate his grave's repose.
But when revolving months have won their way,
When smile the woods, and when the zephyrs play,
When laughs the vivid world in summer's bloom,
He bursts; and flies triumphant from the tomb;
And while his new-born beauties he displays,
With conscious joy his altered form surveys.
Mark, while he moves amid the sunny beam,
O'er his soft wings the varying lustres gleam.
Launched into air, on purple plumes he soars,
Gav nature's face with wanton glance explores;
Proud of his varying beauties wings his way,
And spoils the fairest flowers, himself more fair than they.

(*From*) HAWORTH.

Dipt in the richest tincture of the skies,
Where light disports in ever mingling dyes,
While every beam new transient colour flings,
Colours that change whene'er they wave their wings.

POPE.

THE BUTTERFLY'S BIRTHDAY.

When bursting forth to life and light,
The offspring of enraptured May,
The Butterfly on pinions bright,
Launched in full splendour on the day,

Unconscious of a mother's care,
No infant wretchedness she knew;
But as she felt the vernal air,
At once to full perfection grew.

Her slender form, ethereal light,
Her velvet-textured wings infold;
With all the rainbow's colours bright,
And dropt with spots of burnish'd gold.

Trembling with joy awhile she stood,
And felt the sun's enlivening ray;
Drank from the skies the vital flood,
And wondered at her plumage gay!

And balanced oft her broidered wings,
Through fields of air prepared to sail:
Then on her vent'rous journey springs,
And floats along the rising gale

Go, child of pleasure, range the fields,
Taste all the joys that spring can give.
Partake what bounteous summer yields,
And live whilst yet 'tis thine to live.

Go sip the rose's fragrant dew,
The lilly's honey'd cup explore,
From flower to flower the search renew,
And rifle all the woodbine's store:

And let me trace thy vagrant flight,
Thy moments, too, of short repose,
And mark thee then with fresh delight
Thy golden pinions ope and close.

But hark! while thus I musing stand,
Pours on the gale an airy note,
And breathing from a viewless hand
Soft silvery tones around me float!

They cease—but still a voice I hear,
A whispered voice of hope and joy,
"Thy hour of rest approaches near
Prepare thee, mortal—thou must die!

"Yet start not! on thy closing eyes
Another day shall still unfold,
A sun of milder radiance rise,
A happier age of joys untold.

"Shall the poor worm that shocks thy sight,
The humblest form in nature's train,
Thus rise in new-born lustre bright,
And yet the emblem teach in vain?

"Ah! where were once her golden eyes
Her glitering wings of purple pride?
Concealed beneath a rude disguise,
A shapeless mass to earth allied.

"Like thee the hapless reptile lived,
Like thee he toiled, like thee he spun,
Like thine his closing hour arrived
His labour ceased, his web was done.

"And shalt thou, numbered with the dead,
No happier state of being know?
And shall no future morrow shed
On thee a beam of brighter glow?

"Is this the bound of power divine,
To animate an insect frame?
Or shall not He who moulded thine
Wake at his will the vital flame?

"Go mortal! in thy reptile state,
Enough to know to thee is given;
Go, and the joyful truth relate;
Frail child of earth! high heir of heaven!"

(*From*) KIRBY and SPENCE.



Vanessa C-album with its wings closed.



Pyrameis Atalanta, or Admiral; *a*, Caterpillar, *b*, Chrysalis, and *c*, perfect Butterfly.

INTRODUCTORY.

When I was a very little boy indeed—I will not say how long ago—I loved butterflies much better than books, and the teachings of Nature much better than the teachings of governesses, and I recollect, as well as if it were yesterday, the first butterfly I ever saw: it was sitting on a leaf, and I called out, "Oh, look what a beautiful flower!" and I tried to pick it, but away it flew; and I recollect that I cried out, "The beautiful flower has flown away." How lasting are early impressions! I have never forgotten that butterfly, and to this hour I cannot disconnect the idea of a butterfly and a flying flower. It was not, however, until I was about twelve years of age that I began seriously to think of writing a "History of Butterflies," which project was carried out some year or so afterwards, and the manuscript still exists. When, after the lapse of nearly half a century, I was requested to do the same thing for publication, all the names on which I had once doated, *Equites*, *Achivi*, *Parnassii*, *Danai*, *Nymphales*, and *Plebeii*, were either absolutely forgotten, or were curiously examined as though they were the fossil remains of some unknown world—more wonderful than this, the Greeks had become the wives of the Trojans, and, instead of contending with spears and swords, had settled their differences, and were ranged side by side in the drawers of every museum. A new arrangement and new views had superseded the old ones, and all my puerile labours had been rendered valueless; but I well recollect that Robert Southey, having been reproached with early writings, at variance with those of his more advanced years, bravely said, "I am no more ashamed of those writings than I am of having been a boy," and I fully enter into his feeling, and am no more ashamed of my first "History of Butterflies," than I am of having once been but twelve years of age. Neither can I imagine that we are even now approaching perfection, but quite anticipate that another generation will look down on my "*Detegentes*," "*Celantes*," "*Suspensi*," and "*Cingulati*" with

the same smile of placid superiority that I am now regarding the heroes of Troy and Greece. It is perfectly right that it should be so. What were the use of study if improvement were forbidden!

Every one now knows that a butterfly was not always a butterfly; probably every one then knew it, but there is little trace of that knowledge in the standard works of Linnæus and Fabricius, or in that of our own venerated Haworth. Every butterfly comes from an egg; from that egg emerges a caterpillar (*a*); that caterpillar sheds its skin some four, five, or half-a-dozen times, and then changes to a chrysalis (*b*); and in course of time that chrysalis bursts open and forthwith issues a butterfly (*c*). (See figure on preceding page.)

This seems a great mystery: and the learned in all ages—I mean, in all entomological ages—have availed themselves of the mystery as a plea for exhibiting their erudition, their profound knowledge: some of them demonstrate to their own entire satisfaction that the outer covering, or skin, has the power of evolving, from its inner surface, a second skin, destined to take the place of the first, as soon as that is done with, and cast off; that this second skin evolves a third; this third a fourth, and so on until the last skin evolves a chrysalis, and the chrysalis a butterfly, with which event the power of evolution ceases, and the life of the individual is consummated and completed on its acquiring the new power of continuing its kind. Another set of philosophers contend that, from the very first, the egg contains all the parts and all the coverings of the future caterpillar, chrysalis, and butterfly; which last only awaits the escape from these in order to exhibit and enjoy its final and matured condition.

This view of the case is in accordance with my own theory: theory, you will please to remember, is an inference based on facts; it is perfectly distinct from hypothesis, an inference founded on conjecture. When I was very much younger I recollect being struck with an exhibition which may be a common one, but it is one I have only witnessed once: it was at a travelling circus, and at this strange place I saw an apt illustration of my theory of butterfly development. A horse was led into the circle carrying on its back what looked to me like a tar-barrel: at first the pace was very slow, but gradually increased. As the performance proceeded, the head of the barrel was forced out by some internal agency; then a head appeared, and then arms, and then the barrel fell to pieces, and a rough looking countryman abundantly muffled up in coats stood on the horse's back; the whip was cracked, the pace quickened, and the rider threw off his upper coat; faster still, he threw off a second coat, a third, a fourth; faster and faster, more and more coats. He seemed to wear enough coats to stock an old clothes shop, and to be very regardless of their value, as he threw them into the middle of the circle. The audience screamed with delight as the fun grew "fast and furious," until the rider appeared as an elegant female in short, pink, spangled skirt, a striking lack of clothing about the legs, and wearing a pair of glittering wings, possibly intended to resemble those of a butterfly. The pace slackened, the horse panted with the exertion, the audience applauded, and the lady bowed her thanks for the applause.

Now, just in the same manner as that elegant horsewoman must have been contained in the barrel and in the coats, so I suppose the butterfly to be confined in the egg, and the various skins or envelopes to have covered it from the very first, although perfectly concealed from human observation; the chief difference between the two being the gradual enlargement of the insect and the diminution of the rider: for as she cast off one garment after another, she seemed to "grow small by degrees and beautifully less"; whereas the butterfly after throwing off each of its garments seems to increase in size as though by natural expansion: with this exception the simile is perfect.

Such is the life-history of every butterfly; and if not a mystery or a miracle, it is still a history worthy the study of every rational being. How wonderful is the change of the same creature from a crawling caterpillar to a

soaring butterfly! I wish my readers to regard it as many of our poets and philosophers have done. The caterpillar, greedy, crawling, toiling for its very life, much resembles a man in his daily occupations; the chrysalis has no power to move, eat, or act in any way, and many actually bury themselves in the ground and there await the change to a butterfly, resembling man when dead and in his grave. Lastly comes the butterfly, bursting from its prison-house, and borne from place to place on beautiful wings. So is it appointed for the man who has walked uprightly on the earth, to rise from the tomb and ascend, a happy spirit, to regions of bliss. (See the prelude of mottoes with which I have prefaced these observations.)

Butterflies and moths together constitute a great and principal class of insects, which is called Scale Wings, or *Lepidoptera;* each individual possesses four wings, all of which are covered with scales.

I will now explain, as well as I am able, how to know a butterfly from a moth. In the first place, a butterfly always flies in the daytime. In the second place, it always rests by night, and almost always in rainy or cloudy weather. In the third place, when it is resting, it raises its wings, in some instances pressing them together back to back, so that the four wings look only like two wings, as shown at page 2 at the end of the mottoes: but a moth turns its wings downwards instead of upwards, folding them round its body. Again, the hind wings of a butterfly are stiff, and you cannot fold them up; but the hind wings of a moth are almost invariably neatly folded up lengthwise, and quite hidden beneath the fore wings. Then, again, both butterflies and moths have two feelers attached to the head, just in front of the eyes; we call them antennæ, and you will see them in every figure in the following pages. These in different insects are of different shapes; but in butterflies they generally have a little knob at the end. Then there is something else about the antennæ that is a still better guide to you than the knob at the end; and that is, that the owner cannot stow them away or hide them; whether the butterfly is asleep or awake, its antennæ are always stretched out in front, or held quite upright. Now a moth, when going to sleep, turns its antennæ under its wing, or conceals them in some similar manner, both from observation and from injury. Again, the eyes of a butterfly are very much larger than those of a moth, because the butterfly flies by day. The waist of a butterfly is nipped in, making the division into thorax and body very distinct; but there is no such distinct division in a moth: and hence the butterflies are called Pedunculated Lepidoptera (in science *Lepidoptera Pedunculata*), and the moths, Sessile-bodied Lepidoptera (in science *Lepidoptera Sessiliventres*). If you attend to all these differences, you will soon learn to distinguish at first sight an English butterfly from an English moth. No sooner, however, does the entomologist become acquainted with exotic butterflies and moths, than he finds exceptions and difficulties arise which scientific writers have rendered almost insuperable by the diversity of their opinions and the extreme skill with which they have been urged. On this subject it will be unavailing to enter here. It will be sufficient for me to say that the scientific are equally divided in opinion whether the insects belonging to the most magnificent order of sun-loving Lepidoptera—I mean the *Uranites*—should be regarded as butterflies or moths. My own opinion is decidedly in favour of considering them butterflies; but then it is an opinion only, so I will not urge it, but proceed to introduce a few general observations on butterfly life in its four different stages.

THE EGG STATE.

It is a most interesting occupation to watch the female depositing her eggs, and to observe the extraordinary sagacity she displays in selecting the leaf proper for the food of the future caterpillar. In a hedge or coppice, densely crowded with every kind of native shrub, the Emperor selects the sallow, the White Admiral the honeysuckle, and the

Brimstone the buckthorn. Hardly ever, by any chance, is the egg of one species laid on the food-plant of another. There are, however, occasional exceptions; and these very exceptions display an amount of botanical knowledge which, of course, we must consider as instinctive or intuitive knowledge, possessed by these females, that cannot fail to excite our admiration; it is that when the usual food-plant is not at hand, and the egg must be extruded, the most nearly allied species is selected and made to serve as a substitute: for instance, when the common species of buckthorn (*Rhamnus catharticus*) cannot be found, the rarer species (*Rhamnus frangula*) is made to supply its place. When a female butterfly is about to lay her eggs, her conduct is totally different from that ordinarily to be observed: she assumes a grave, important, and business-like demeanour, with which the practical observer soon becomes familiar; she exhibits none of that volatility and carelessness which characterises a butterfly when engaged in the lighter labours of life, such as making love or sipping honey. Her eggs are generally covered with liquid glue at the moment they are laid, and this glue fastens them to whatever substances the parent butterfly pleases, generally the surface of a leaf, but sometimes to a twig or the bark of a tree. This latter plan is always adopted by the English species of Hairstreaks.

There is, however, one striking exception to this rule, and others of course may be expected. The Marbled White, as Mr. Moncreaff informs me, drops her eggs at random among the herbage, being perfectly well assured that the young caterpillar when hatched will find out, and will crawl up, some blade of grass suitable for him to feed on.

The eggs of butterflies differ very remarkably both in size and shape: in some the surface is most beautifully ornamented as with carved work, but a thousand times more delicate and finer than any carving that human hands could execute; some are exquisitely fluted; others are ribbed, the ribs being from ten to thirty in number, and these are connected by a great number of excessively minute transverse raised lines; some are entirely covered with a net-work of raised lines; others have rows of minute warts, forty or fifty in number, all of which converge to a point at the top of the egg; others are perfectly smooth and without markings of any kind; some few of them have a lid at the top, which the young caterpillar gently lifts off when he makes his first appearance in the world. Indeed, the variety of surface in eggs is almost infinite, and so is the shape; some being round, others oblong, and others like champagne bottles, standing upright.

One of the most curious and striking facts is the extreme difference in the eggs of species, which, in the perfect state, closely resemble each other; thus the egg of the Large Tortoiseshell is pear-shaped and smooth, while that of the Small Tortoiseshell is oblong, with eight very conspicuous ribs. The characters of each egg are, however, so constant in each species of butterfly, that any one who has paid attention to the subject can immediately say to what butterfly any particular egg belongs. Nevertheless, a naturalist must not delude himself into a belief that he can classify butterflies by the shape or structure of their eggs.

This remarkable diversity in the eggs of butterflies, being so opposed to the sameness of shape and surface in the eggs of birds, has not only excited the admiration, but induced the speculation, of philosophers in all ages. Thus Dr. Paley had suggested, that it "may in many instances be referred to that will to alter forms, and so to glorify His wisdom and power, which seem so often to have guided the Great Author of Nature"—a position that seems to me untenable, because it savours of *seeking* that glory which His wonderful works spontaneously afford; and thus to attribute to a Creator feelings that would scarcely dignify a creature. We cannot be too cautious in assigning human motives to the Most High. Man may, perhaps, build marvellous structures, carve exquisite figures, perform feats of intellectual or manual dexterity for his own honour and glory, and without any ulterior beneficial object, but he must not attribute

such a course to his Maker. These reflections have been forced on me by the leaders in our science, or I would not have ventured to express them. Kirby and Spence seem entirely to accept Dr. Paley's explanation.

The substance of the egg-shell is peculiar, but alike in all. It seems to me entirely different from that of a bird, which abounds with calcareous matter, and, in consequence, is very brittle; whereas the egg-shell of a butterfly is more like thin horn—very elastic, very tough, and very pliable—bending in any direction as soon as the caterpillar has escaped. It contains no carbonate of lime, and chemists tell us that it is not acted on by diluted sulphuric acid. Kirby compared the egg-shell of a butterfly to the membrane that lines the egg-shell of a bird; but it appears to me much less pliable and even less flaccid, and much more elastic, than that integument. The interior of the egg consists of a transparent colourless fluid, much resembling the white of a bird's egg; but I have never been able to find anything at all analogous to the yolk.

With the act of egg-laying the care of the mother butterfly ceases altogether. Although we have a great number of pleasing accounts of plant-bugs and earwigs sitting on their eggs, and hatching them by the warmth, or, more properly speaking, by the coldness of their bodies, and afterwards of collecting them under their bodies as a hen does her chickens, and still after that of the little ones following their mother in a family group, just as chickens run after a hen; still nothing of the kind has ever been noticed in butterflies, and the parent seems invariably to have completed her task when she has placed her yet unconscious progeny in a situation where it will eventually be able to obtain its own livelihood. Few butterflies long survive the act of oviposition: it seems the end for which they have lived; and when it is accomplished the termination of their own life is approaching, and the fragile parent resigns its place in the world to its equally fragile descendants. Of the seasons for egg-laying and caterpillar feeding I shall have more to say hereafter. It is not a matter that is governed by any law of general application.

The colour of butterflies' eggs is generally pale green or pale yellow, or, in some instances, pure ivory white; but before the shell is burst, and the caterpillar emerges, a very great change takes place; the colour becomes deeper and darker, and the tints—especially the darker ones of the future caterpillar—become visible through the shell, the transparency of which is thus most clearly demonstrated.

THE CATERPILLAR STATE.

Dr. Virey, as well as Kirby and Spence, have followed the old authors in stating that the caterpillars of *Lepidoptera* appear simultaneously with the leafing of trees, and butterflies with the blooming of flowers: however this may be in those lands where this supposed law was laid down, it is quite certain that the great seasons for caterpillars are the end of May and end of August, the first simultaneous with the blooming of flowers, the last with the fine autumnal tints of the falling leaf; so that we must not regard Virey's theory as perfectly satisfactory: it is truthful and tenable only in part. The eggs of all butterflies do not hatch at the same time; the caterpillars do no feed at the same time; they do not turn to chrysalids at the same time. Miss Jermyn, in her "Vade Mecum"—a book that I used to study with intense interest—follows out the theory by telling us that "nature keeps her butterflies, moths, and caterpillars locked up during the winter in their egg state;" evidently intending them to hatch in the spring, feed in summer, and fly in autumn. I believe that Nature obeys her own laws, totally regardless of those we lay down for her guidance. The caterpillar emerges at all seasons; and as the young lawyer is facetiously said to eat his way to the bar, so does the young caterpillar prepare himself for public life, by gnawing away a sufficient portion of the egg-shell in which he had been confined to allow of his escape,

and by swallowing the chips he had made during the operation. Indeed, this gastronomic feat is often followed by a more extensive performance of the same kind; for I have often watched him devour the whole of his cradle, except a small shining circular patch where it had been glued to the object on which it was laid. No sooner, however, is the cradle disposed of than he begins to feed on what we should consider a more natural and appropriate food, namely, the leaves of trees and herbs—a diet to which he confines himself during the remainder of his caterpillar existence. His exertions in the way of leaf eating are truly wonderful, and many entomologists have amused themselves and their readers by calculating how many times its own weight a caterpillar can consume in the course of twenty-four hours—a calculation which tends greatly to the credit of the calculator, but not much to advance the science of natural history.

A caterpillar's life is not, however, one of continual feasting: he is subject to periodical attacks of illness, three, four, five, or six in number; these arise from his body growing too large for his skin, which, as a natural consequenee, grows too small and oppresses him so much that it must be got rid of. The caterpillar is perfectly aware of this, and prepares in the most skilful and methodical manner for the important event. He first spins or weaves a little carpet on the surface of the leaf or twig where he has been feeding, and then fixes himself to this by means of a circle of very small delicate hooks which surround each of his claspers. The term claspers I will presently explain. By means of these hooks the caterpillar is able to cling so tightly to the carpet he has prepared, that I believe it is quite impossible to remove him without damaging both the carpet and the hooks; in fact, in the attempt to remove a caterpillar when thus fixed, the life of the caterpillar is often sacrificed. The process of moulting is a very severe one; and unless the caterpillar be in a state of perfect health at the time it is often fatal, and the poor creature is found dead and still hanging by its claspers from its silken carpet. When the process of moulting goes on favourably it may thus be described: the fore part of the body is turned vigorously from side to side, the skin of the second, third, and fourth segments opens down the back, and the head and anterior part of the caterpillar protrude through the opening: then immediately beneath the head may be seen the shell-like covering of the old head, split down the middle and often into three pieces; the caterpillar next, with a series of convulsive struggles, creeps out of his old skin, which is left attached to the carpet, and is frequently so perfect and apparently so plump that I have been completely deceived into supposing that he was still wearing his old clothes.

The head, antennæ, jaws, and legs of the caterpillar are persistent, and their horny covering only is shed at the period of moult; and Swammerdam tells us that not only the horny covering of these parts and the skin of the body comes away at each moult, but also that "the throat and a part of the stomach, and even the inward surface of the great gut, change their skin at the same time. But this is not the whole of these wonders, for at the same time some hundreds of pulmonary pipes within the body cast also each its delicate and tender skin. These several skins are afterwards collected into eighteen thicker, and, as it were, compounded ropes—nine on each side of the body—which, when the skin is cast, slip gently and by degrees from within the body through eighteen apertures or orifices of the pulmonary tubes, nine on each side. Two other branches of the pulmonary pipes, that are smaller and have no points of respiration, cast a skin likewise. If any one separates the cast little ropes or congeries of the pulmonary pipes with a fine needle he will very distinctly see the branches and ramifications of these several pipes and also their annular composition."

This really marvellous description of the moulting of the skins of the viscera is copied from Kirby and Spence, and not from Swammerdam, because I do not possess the original; and much as I dislike to quote secondhand, I

have no hesitation about accepting the facts recorded. There is another feature in this periodical moulting equally interesting, and that is that the spines, hairs, warts, and other appendages of the skin, so conspicuous in many of the caterpillars, are shed with the skin, and, we learn from the same high authority, are replaced by similar ones which existed and have been perfected beneath the skin that has been cast, although of necessity bent down and flattened between the new and old cuticles. The observations of Swammerdam are confirmed by precisely similar ones recorded by Bonnet, but have been called in question in some of their details by Herold; still these objections have only been raised in respect of the moulting of some of the minor air-vessels. No doubt has been expressed as regards the larger air-vessels commonly known as tracheæ.

After this formidable operation of moulting is accomplished, the body is excessively soft and tender; the head, afterwards so hard, and the legs afterwards so horny and so sharp-pointed, are as pliable and yielding as the most delicate skin, and are covered with a transparent gummy fluid, which was previously confined between the new skin and the old: as the creature now lies exhausted by the exertion, the fluid gradually evaporates, and the new skin gradually acquires the hardness and dryness of the old one: and when the caterpillar has thoroughly recovered its former state, its appetite seems to return, and its voracity to be redoubled, as if to make amends for its lengthened abstinence. Its colours, which on first emergence were dull and faint, become vivid and distinct, and its whole appearance is altered and improved by the ordeal through which it has passed.

The caterpillars of butterflies are extremely fastidious about their food, in this respect differing very essentially from other leaf-eating creatures. We know that horses, cows, sheep, and pigs will eat with apparent relish almost any foliage that is offered them, and birds in a cage seem glad of every green leaf. With caterpillars it is otherwise; they uniformly refuse almost everything except the leaves of that particular species of tree, shrub, or herb on which the parent had laid its egg. It is very interesting to observe the wonderfully perfect power of discrimination which they exhibit, a power that seems vested in twelve minute microscopic eyes, seated six on each cheek, almost close to the mouth: these eyes are highly convex lenses: strikingly reminding one of a Coddington lens: such is the extreme convexity of these eyes, that it is impossible for them to convey an idea of any object to the insect using them unless they are brought into contact, or nearly so; consequently, the caterpillar seems to examine with his mouth the surface of each leaf before he ventures to nibble. If you take a caterpillar from oak and put it on hawthorn, it will maunder about in hopeless helplessness; and if you change one from hazel to birch, the same effect will be produced: the position of these microscopic eyes is admirably adapted for the purpose they serve: they are only capable of discerning an object immediately below them. How different is this from the conduct of the parent butterfly, which selects even from a distance the leaf designed by Nature to serve as food for her offspring.

The caterpillars of butterflies are composed of thirteen rings or joints, which entomologists call segments.

The first segment is the head, and is furnished with two short antennæ, two feelers, two jaws, and the twelve minute microscopic eyes to which I have already alluded.

The second has two spiracles or breathing holes, one on each side, and two jointed legs.

The third has two jointed legs only.

The fourth has two jointed legs only.

The fifth has two spiracles only.

The sixth has two spiracles only.

The seventh, eighth, ninth, and tenth, have each two claspers and two spiracles.

The eleventh and twelfth have each two spiracles only.

The thirteenth has two claspers only.

It is almost useless to say anything about the use or objects of the ANTENNÆ, after all that has been written; but it is the general fault of all scientific men who have written on the subject to assume that they must be

the seat of one of those senses the use of which we seem to understand so well in ourselves. Now, it is most illogical to assume that the antennæ serve for purposes of sight, taste, smell, hearing, or touch, because we possess these senses seated in certain organs in our own bodies. We cannot refer the wings of insects to any organs we ourselves possess, and we only learn their use by seeing them employed. Why may not the antennæ be the site of some other function not performed by any of our own organs? Why seek to invest them with the powers of our own eyes, or ears? The subject may be safely left as one above our comprehension.

The SPIRACLES are a series of nine oval holes on each side, through which the caterpillar breathes: they communicate with the trachæ or breathing-tubes I have already described as moulting in so marvellous a manner simultaneously with the exterior skin.

The CLASPERS are fleshy, retractile, or partially retractile, organs, ten in number, distributed as above indicated; their use is to grasp firmly the food-plant on which they are standing, and thus allow the legs perfect freedom of motion. They are possessed only by caterpillars, never occurring in the perfect insect, and are very rarely found in any caterpillars excepting those of butterflies, moths, and sawflies. Each clasper terminates in a flat circular disk, the margin of which is fringed with recurved prehensile hooks.

THE CHRYSALIS.

The next change is one of the most important steps in the life of a butterfly: it ceases to eat; and not only this, the caterpillar seems to take the utmost pains to eject every particle of food from the alimentary canal, and, we are told, evacuates also, together with the excrement, the very lining of its intestines. The colours of the skin change, fade, and entirely disappear; and the creature wanders restlessly and, as we should say, unmeaningly from place to place. Whatever the object of this restlessness—and I do not doubt it has some object in that great scheme of life, so complete in all the parts we can understand—still, I say, whatever the object of this restlessness, its termination is invariably the same; it ends in the creature finding some place of real or fancied security in which to undergo its change to a chrysalis. This being found, the next process is to spin a little pad of silken threads crossing each other in every direction—and it would seem that almost every caterpillar has the power of elaborating silk, and of emitting it through the mouth in the form of thread; when the silken pad is complete, the caterpillar grasps it with his last pair of claspers, and then allowing his body to hang down, waits awhile for the change that is progressing within. After the lapse of a day, or sometimes two days, we observe something like a renewal of those twistings and contortions which precede or accompany each moulting, and then the caterpillar skin is seen to open behind the head, and by the alternate contractions and dilations, the chrysalis, now perfectly formed, is seen to force itself through the opening, the upper part of the back coming first, and acting as a wedge to open the slit wider and wider, until all the chrysalis has passed through the opening, and the skin of the caterpillar, wrinkled and shrivelled, is pushed down to the lower end of the chrysalis, and *there* remains, just like a stocking rolled down to the ankle before withdrawing it from the foot. "The chrysalis being much shorter than the caterpillar is as yet at some distance from the silken pad on which it is to be fastened; it is supported merely by the unsplit terminal portion of the latter's skin. How shall it disengage itself from the remnant of its case, and be suspended in the air while it climbs up to take its place? Without arms and legs to support itself, the anxious spectator expects it to fall to the earth. His fears, however, are vain; the supple segments of the body of the chrysalis serve in the place of arms. Between two of them, as with a pair of pincers, it seizes on a portion of the skin, and bending its body once more, entirely extricates its tail from it. It is now wholly out of the skin, against one side of which it is

supported, but yet at some distance from the leaf. The next step it must take is to climb up to the required height. For this purpose it repeats the same ingenious manœuvre; making its cast-off skin serve as a sort of ladder, it successively with different segments seizes a higher and a higher portion, until in the end it reaches the summit; with its tail it feels for the silken threads that are to support it. But how can the tail be fastened to them? you ask. This difficulty has been provided against by Creative Wisdom. The tail of the chrysalis is furnished with numerous little hooks pointing in different directions, as well adapted to the end in view as the crochets on the caterpillar's claspers, and some of these hooks are sure to fasten themselves upon the silk the moment the tail is thrust amongst it. Our chrysalis has now nearly performed its labours; it has withdrawn its tail from the slough, climbed up it, and suspended itself from the silken pad, manœuvres so delicate and perilous that we cannot but admire that an insect which executes them but once in its life should execute them so well; nor could it, as Reaumur has well and piously observed, 'had it not been instructed by a Great Master.' One more exertion remains: it seems to have as great an antipathy to its cast-off skin as one of us should, when newly clothed after a long imprisonment, to the filthy prison garments we had put off. It will not suffer the memento of its former state to remain near it, and is no sooner suspended in security than it endeavours to make it fall. For this end it seizes, as it were, with its tail, the threads to which the skin is fastened, and then very rapidly whirls itself round, often not fewer than twenty times. By this means it generally succeeds in breaking them and the skin falls down. Sometimes, however, the first attempt fails: in that case, after a moment's rest, it makes a second, twirling itself in an opposite direction, and this is rarely unsuccessful. Yet now and then it is forced to repeat its whirling not less than four or five times, and Reaumur has seen instances where the feet of the skin were so firmly hooked that, after many fruitless efforts, the chrysalis, as if in despair, gave up the task and suffered it to remain. After these exertions it hangs the remainder of its existence in this state until the butterfly is disclosed."

This beautiful and graphic account of the conduct of the chrysalis on what may be called its birthday, is extracted from that inexhaustible mine of insect-lore, "Introduction to Entomology," by Kirby and Spence. I have, however, verified the facts from actual observation, and only copy the details instead of writing them anew, because the phraseology of their admirable writings is so much better than my own. Still, although I can confirm the statements and attest the accuracy of the description, I am unwilling to accept the reason assigned for some of these extraordinary proceedings. I do not imagine that the whirling movement is performed for the purpose of getting rid of the cast skin: in the *first* place, because I find that many species elect to retain the skin until the final assumption of the butterfly state, and to preserve it like the rolled-up stocking to which our authors have compared it—this is certainly the case in that family which I shall call *Satyridæ*, and probably in many others; and, in the *second* place, this whirling is not peculiar to this period of chrysalid existence, and can be induced by irritation whenever an entomologist inclines to make the experiment.

I must here explain that the chrysalids of insects are of three kinds, called Amorphous (in science *Amorpha*), when they have no resemblance to the perfect insect; Necromorphous (in science *Necromorpha*), when they have a striking resemblance to the perfect insect, and exhibit all its limbs swathed as it were in swaddling-clothes; and Isomorphous (in science *Isomorpha*), when they resemble the perfect insect in everything but the possession of wings. The amorphous and necromorphous chrysalids can neither eat, fly, nor run; the isomorphous chrysalids, on the contrary, eat voraciously, leap and run with vigour, but cannot fly. *Lepidoptera*, and consequently butterflies, belong to the amorphous division.

THE BUTTERFLY.

When the time for the final change has arrived, the colours and markings of the perfect insect begin to make their appearance through the horny shell which envelopes the chrysalis, and in a short time this horny shell splits in various places, cracks open between pieces of the shell, and the perfect insect emerges. I say perfect, but, alas, how apparently imperfect! The wings, instead of being those rigid and powerful organs which are soon to become so characteristic of a butterfly, and are so well adapted to bear him on the most distant aërial excursions, are diminutive, shapeless abortions, folded over his chest, limp, pliable bags, filled with colourless blood which has hereafter to be diffused throughout the body. "To observe how gradual and yet how rapid was the development of the joints and organs, and particularly of the wings, and the perfect coming forth of the colours and spots as the sun gave vigour to it, was a more interesting spectacle." I will continue to quote Kirby and Spence, for, although I can readily imagine no one has so long or so intently studied these proceedings of Nature as I have done, yet I feel painfully conscious of my inability to describe them with the force and truthfulness that so distinguish the writings of those illustrious entomologists. They are describing the emergence of the Swallow-tail:—"At first it was unable to elevate or even move its wings, but in proportion as the aërial or other fluid was forced by the motion of its trunk into the nervures, their numerous corrugations and folds gradually yielded to the action, till they had gained their greatest extent, and the film between all the nervures became tense. The ocelli and spots and bars, which appeared at first as but germs or rudiments of what they were to be, grew with the growing wing, and shone forth upon its complete expansion in full magnitude and beauty. To understand more clearly the cause of this rapid expansion and development of the wings, I have before explained that these organs, though often exceedingly thin, are always composed of two membranes, having most commonly a number of hollow vessels, miscalled nerves, running between them. These tubes—which, after the French entomologists, I would name *nervures*—contribute as well to the development of the wings as to their subsequent tension. In the chrysalis, and commonly afterwards, the two membranes composing the organs in question do not touch each other's inner surface as they afterwards do: there is consequently a space between them; and being moist and corrugated into a vast number of folds, like those of a fan, but transverse as well as longitudinal, and so minute as to be imperceptible to the naked eye, the wing appears much thicker than in the end. Now, as soon as the insect is disclosed a fluid enters the tubes, and being impelled into their minutest ramifications, necessarily expands their folds; for the nervures themselves are folded, and as they gradually extend in length with them, the moist membranes attached to them are also unfolded and extended. In proportion as this takes place the expanding membranes approach each other, and at last, being dried by the action of the atmosphere, become one. To promote this motion of the fluid seems the object of the agitations which the animal gives from time to time to its unexpanded wings."

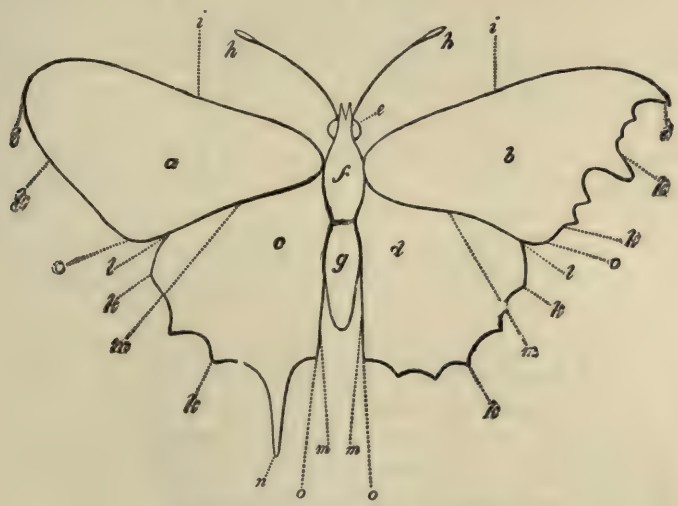
That a fluid precisely analogous to our blood, but having no red colour, circulates in every part of an insect's body, has been proved beyond question. Dr. Bowerbank was the first entomologist in this country who by means of a powerful microscope established the fact; and although prior to this important discovery there was a disposition to doubt the existence of circulation in the insect world, every man of science at once accepted Dr. Bowerbank's views as conclusive; and no hesitation is now expressed on a subject where an exception to the ordinary law of Nature had been for a series of years supposed not only possible but unquestionable—so ready are we to accept any conclusions that supersede the trouble of investigation.

We have seen that the membranous portion of the wing is spread between certain supports, which Messrs. Kirby and Spence, adopting the nomenclature of French entomologists, have

been pleased to term "nervures." It results from a careful examination of the writings of entomologists, that exactly one third have described these supports as "veins," exactly one third as "nerves," and exactly one third as "nervures," or "nervules"; the advocates for each term having shown to their own entire satisfaction its peculiar and exclusive propriety. The argument always runs thus: "We know very well that these organs are not veins (or 'nerves', or 'nervures,' as the case may be), but it is a matter of convenience so to denominate them; and no sensible man will deny the advantages of a uniformity in anatomical nomenclature." This reasoning appears to me somewhat illogical: if we "know very well" that the wing of a bird is not a leg, it can be no convenience to any one to call it a leg; if we "know very well" that the head of a horse is not its tail, it really can be no convenience to call it a tail. We know exactly the use and object of these supports: it is precisely the same as that of the fin-rays of a fish, which are invariably called "rays," and therefore, wherever I have had occasion to mention these rays, either in the present "history," or in that previously published of the "British Moths," I have invariably called them "rays"—a term which I venture to hope all my readers will accept, since they cannot fail to understand.

EXPLANATION OF TERMS.

With the single exception of wing-rays, which my readers will please to understand as precisely equivalent to the fin-rays of fishes, I shall use no terms except those of universal acceptation when speaking or writing of insects; and I could wish that I had no occasion to use a single word that could not be found in Johnson's Dictionary; but this is very difficult, and I find, after every endeavour to avoid the use of new words, or of applying new meanings to old words, I am absolutely compelled to do that which I have the most anxious desire to avoid. It is no common achievement to have removed so many of those stumbling-blocks to the acquisition of scientific knowledge—italics, abbreviations, and signs; this is happily accomplished, and we must content ourselves therewith, and not quarrel over a few unusual words, but endeavour to make them both familiar and intelligible.



Explanatory Figure of a Butterfly.

In order that the terms used in describing may be rendered as intelligible as possible, I have drawn the outline figure of a butterfly, and indicated by letters the different parts I

have had occasion to explain. The figure is perfectly imaginary; no such butterfly having ever existed; it is comprised of parts of butterflies which really do exist; one wing is abstracted from a Swallow-tailed, another from an Angle-winged, and so on.

a, *b*, *c*, *d* are the four wings.

e, the head.

f, the thorax.

g, the body.

h, the antennæ, or feelers.

These are the only parts of a butterfly mentioned in descriptions, except the legs, which are generally hidden from sight, and never used to distinguish species, but only families from each other.

We will now proceed to consider the margin of the wing; there is very little occasion to describe the word "margin"; it is familiar to every one: the outline or boundary line of the wing is the margin. But there are several sides to the margin: that part of the margin which touches the thorax (*f*) is the base.

i is the costal margin, and extends from the thorax (*f*) to the tip (*l*).

k is the hind margin, it is that part of the margin farthest from the thorax (*f*) and extends from the tip (*l*) to the anal angle (*o*).

l is the tip of the wing.

m is the inner margin, so called because innermost or nearest the body; the butterfly can almost bring this margin close to its body so as to touch it: this inner margin (*m*) extends from the anal angle (*o*) to the thorax (*f*).

n is the tail; this occurs rarely, and only on the hind wings. Of course this is not a real tail, but only a projecting portion of the wing, and made of membrane exactly similar to the rest.

o is the anal angle of the wing.

Lastly, as regards the shape of the wing, or perhaps, more properly and precisely speaking, the outline of the hind margin: you will see at the most cursory glance, that this outline differs in the fore wings I have represented.

a is a rounded wing, or a wing with the hind margin rounded.

b is an angled or angulated wing, or a wing with the hind margin angled.

c is a tailed wing, or a wing with the hind margin tailed, *n* being the tail.

d is a scalloped wing, or a wing with the hind margin scalloped or cut out into semicircular notches.

HYBERNATION.

This word has puzzled many, and its meaning, as applied to butterflies, still more. The life of a butterfly extends over twelve months, subject to certain exceptions which will be duly explained in the proper place. The round of existence thus occupying a year, and comprising the four states of egg, caterpillar, chrysalis, and perfect insect, it follows that one of these states must occur in the winter, because the year must include the winter months; but it is ordered by an all-wise and overruling Providence that the winter season shall not occur to all butterflies when they are in the same state: winter must come, *that* is inevitable; but it comes to some when they are eggs, to some when they are caterpillars, to some when they are chrysalids, and to others when they are perfect butterflies. So that the word "hybernation" being simply equivalent to "passing the winter," it is said, and very properly so, that one butterfly—or, as we entomologists more correctly express it, "one species of butterfly"—hybernates in the egg state, another species in the caterpillar state, and so on, as the case may be. Now, it is a most interesting fact, and one that cannot be too strongly impressed on the memory, that all the individuals composing one kind, or more properly one "species," of butterfly always hybernate in the same state: each adheres strictly to the practice of its species; that is to say that if one Peacock butterfly passes the winter season in the butterfly state, so will its children pass the next winter in the same state, and its children's children the next following winter in the same state, and so on for countless generations. And if one Hairstreak butterfly passes the winter months in the egg state, in like manner will its

children pass the next winter in the egg state, and its children's children the next following winter in the same state, and so on for countless generations. Some doubt appears still to attach to the state in which some of our English butterflies pass the winter months; while others, on the contrary, are ascertained beyond all possibility of doubt.

EIGHT hybernate in the egg state—*Quercus, W-album, Pruni, Betulæ, Bœtica, Ægon, Agestis, Alexis.*

TWENTY-FIVE hybernate in the caterpillar state: *Paphia, Aglaia, Niobe, Adippe, Lathonia, Euphrosyne, Selene, Artemis, Cinxia, Athalia, Sibylla, Iris, Galathea, Epiphron, Medea, Ægeria, Semele, Janira, Tithonus, Hyperanthus, Davus, Pamphilus, Hippothoë, Phlæas,* and *Cratægi:* the last named differs essentially from the rest in being gregarious, and in passing the winter season under cover of a web.

TEN hybernate in the chrysalis state: *Machaon, Sinapis, Brassicæ, Napi, Rapæ, Daplidice, Cardamines, Lucina, Argiolus,* and *Alveolus.* In the winter the chrysalids of these butterflies may be found braced up to the stems of reeds, vetches, hedge-mustard, lady's-smock, and other herbaceous plants, or against park palings, barns, fences, and out-houses of all kinds. In this state they appear to be perfectly indifferent to cold, and may be converted into solid lumps of ice and yet retain life, as is abundantly proved by their emergence as perfect butterflies in May. I have never known a winter so severe as to make any difference in this respect.

TEN hybernate in the perfect or butterfly state: *C-album, Antiopa, Io, Polychloros, Urticæ, Atalanta, Cardui, Rhamni, Edusa,* and *Hyale.* Many of these retire to winter-quarters almost immediately on leaving the chrysalis; some creep into hollow trees; I once found more than forty Peacock butterflies in a hollow oak; some hide in barns, stables, churches, or out-houses, always crawling up among the beams and rafters: they especially delight in pig-styes. It will be observed by anyone who is familiar with the appearance of either of the dark-coloured butterflies I have mentioned, that its colour and appearance, when resting on rough, unplaned wood, with its wings erect and closely pressed together, back to back, resemble so exactly that of the wood that the most practised eye is required to detect it. To this similarity it is often indebted for its safety. When a warmer day than usual occurs during the winter months, these hybernating butterflies crawl out of their hiding-places, slowly flap their wings, as if courting the sunshine, and sometimes venture on a fruitless flight in quest of flowers from which to suck the honey. Every year some country gentleman possessed of observing faculties and a ready pen espies one of these butterflies when out on an ill-advised excursion of this kind, and he forthwith writes to the nearest local paper, and reports the unwonted fact to its delighted readers under the head: "Singular occurrence; unusual mildness of the season." If the discovery falls to the lot of a writing entomologist, he improves the occasion in a different way, thus: "Singular occurrence; unexpected evidence that *Vanessa, Io,* or *Gonepteryx Rhamni*"—as the case may be—"is double-brooded. I have just taken, this 25th of February, a fine and very perfect specimen of *Gonepteryx Rhamni:* now as it is impossible that the specimens which occurred so abundantly last autumn should have survived through the inclement season just past, it is certain that this February specimen must be the descendant of an autumnal specimen, and not one of the same generation." A little more reflection might have induced the query, "On what could the caterpillar have fed during the winter months, seeing that the buckthorn was leafless during the whole time that it ought to have been feeding?"

It is worthy of remark that these autumn-disclosed butterflies, although the sexes occur in equal numbers, rarely take the slightest notice of each other until the return of spring.

CLASSIFICATION.

Having pointed out to the best of my ability those stages in the life of a butterfly, and those characters in the adult butterfly, the modifications and differences in which

will be described in the succeeding pages, it becomes needful to show the application of them to purposes of classification. It will be seen by those who consult the Linnean method, as carried out by our own venerated Haworth, that the perfect insect alone was regarded as furnishing characters for the division and subdivision of groups; but almost simultaneously with the early and invaluable investigations of Linneus, two officers in the Austrian army had discovered the absolute insufficiency of differences in the form of an antenna or the outline of a wing for the foundation of a natural system of arrangement; still, although these gentlemen insisted on the propriety, nay even the necessity, of employing in classification all the characters of caterpillar, chrysalis, and butterfly, our publishing entomologists for more than half a century resolutely resisted the so-called objectionable innovation, and declined to study, except as an authority for the names of species, the most profound and philosophical work that Entomology has yet called into existence.

At last we are beginning to see the necessity for extending the area over which to search for distinctive character. We are now so glad to receive every possible hint from Nature herself, that instead of disregarding the characters of caterpillar and chrysalis, we very frequently wait the discovery of these before venturing an opinion as to the place which any newly-discovered species ought to occupy in a natural system. More than this, a disposition is rapidly gaining ground to acknowledge that the earliest and not the latest stages of an insect's life are the most likely to furnish us with permanent characteristics. It is, however, a matter which I cannot mention without regret, and which certainly may be useful in moderating any extravagant estimate we may form of our own knowledge, that although we accept the importance of the caterpillar and chrysalis in all our arrangements, we have hitherto failed in discovering any character in either by which positively to distinguish a Butterfly from a Moth. This lamentable truth, this necessary admission of ignorance, may not unreasonably suggest the query whether Nature has really drawn any distinct line between the two, and whether the differences which, in common with others, I have pointed out as distinguishing Butterflies from Moths are indeed sufficient for the purpose.

It is doubtless a most noteworthy fact that every character hitherto suggested seems to break down before exceptions, and to destroy the fond hope we may have entertained of being able so to word our definitions that they shall preclude the possibility of exceptions. This, I think, forcibly demonstrates the folly of trying to enforce our views on Nature, who will be sure to have her own way, and go directly to her own object, however inconsistent with our human schemes that object may be. The reader will kindly receive these remarks as somewhat apologetical, and as penned under a deep sense of the imperfection of the classification I am about to propose. I have already explained that the portion of the *Lepidoptera*, or Scale-winged insects, which I am intending to describe, are popularly termed "Butterflies" in England and America, "Papillons" in France, and "Schmetterlinge" in Germany. I propose to classify them as below.

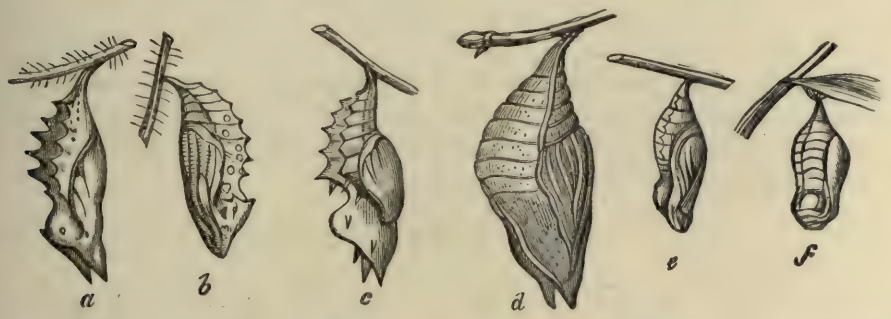
BUTTERFLIES (IN SCIENCE *LEPIDOPTERA PEDUNCULATA.*)

1. EXPOSERS (in Science Detegentes).—Those which in the chrysalis state are exposed to the full influence of weather and light, rarely attempting concealment, and still more rarely protected from rain or snow, wind, heat, or cold. When thus exposed during the winter they are not unfrequently frozen, as already stated, into solid and very brittle lumps of ice, and consequently may be broken to pieces without exhibiting the slightest indication of vitality; yet if left unmolested in the situations they have selected they invariably recover, and revert to the condition in which the frost overtook them. These naked and exposed chrysalids are

usually angular, having ridges and salient points on various parts of the body. Nearly all our British butterflies belong to this group: they may be divided into—

i. Suspended (in science Suspensi), or those in which the chrysalids are attached by the tail only, and hang with the head downwards. The Butterflies which emerge from such chrysalids possess a character quite as distinctive as that of the chrysalids themselves: they have but four perfect legs, instead of six; these are the middle and hind legs; they have claws at the extremities, while the fore legs are imperfect, have no claws, and cannot possibly be used in walking. The circumstance that the Butterflies of this division possess strongly-marked and corresponding characters in the chrysalis and butterfly state is regarded as a sufficient proof that the association is a natural one.

Examples of Suspended Chrysalids.



a. Io b. Atalanta c. Paphia d. Iris e. Megæra f. Galathea

a. Spine-bearers (in science Spinigeri), in which the caterpillars are armed with spines more or less branched: these spines are shed with every moult, but are renewed with the renewed skin, until the final one, when they entirely disappear.

Examples of Spine-bearing Caterpillars.



g. Antiopa h. Io i. Atalanta

b. Slug-shaped caterpillars (in science Limaciformes), in which the caterpillar is sometimes downy or covered with short pile, but is without spines, and is shaped like a slug: its body terminates in two pointed tails, which are directed backwards.

Examples of Slug-shaped Caterpillars.



k. Iris l. Janira m. Galathea

ii. GIRTED (in science SUCCINCTI), in which the chrysalids are not only attached by the tail, but are also supported by a belt of silk, which passes round the middle of the body, and is firmly fixed on each side. These chrysalids have the heads pointed upwards. The butterflies have six perfect legs.

Examples of Girted Chrysalids.



n. Machaon o. Cratægi p. Brassicæ q. Daplidice r. Cardamines s. Hyale

a. Woodlouse-shaped caterpillars (in science ONISCIFORMES), in which the caterpillars are shaped like a woodlouse, the head being small and retractile and the legs and claspers concealed.

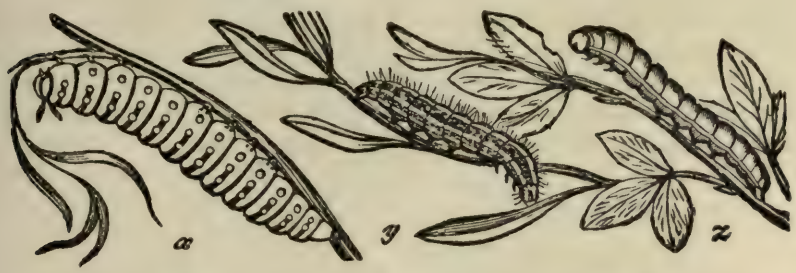
Examples of Woodlouse-shaped Caterpillars.



t. Betulæ u. Pruni v. Corydon

b. Cylindrical caterpillars (in science CYLINDRACEI), in which the caterpillars are cylindrical, the head exserted, and the legs and claspers exposed.

Examples of Cylindrical Caterpillars.



x. Machaon y. Daplidice z. Hyale

2. CONCEALERS (in science CELANTES), or those of which the caterpillars hide themselves in a silken follicle or cocoon before changing into chrysalids. These cocoons are generally hidden in clefts of the bark of trees, in rolled-up leaves, or at the roots of grass; some of them are even attached to stems of grass. While the Exposers are what might be called the true or typical butterflies, the Concealers are somewhat intermediate between Butterflies and Moths. In this country the Concealers are few in number, small in size, and insignificant in appearance; but in tropical and sub-tropical countries they are numerous, large, and very beautiful.

SUCH is an outline of the characters I propose to employ in the definitions which follow. It will be perceived they embrace every state of the living insect. In the year 1834 I made a first attempt to introduce into entomology a formula of classification similar to that suggested by Jussieu, and adopted by Decandolle in the sister science of botany. Up to that date it had been the uniform usage of entomologists to make an "order" of insects correspondent with a "class" of vertebrate animals or of plants—a usage which I cannot but consider undesirable to maintain; and I therefore think it best to employ a formula of nomenclature more in accordance with that which obtains in other divisions of organised beings, believing the less we endeavour to eliminate insects from a *general* classification, or British insects from a *general* system of insects, the more likely are we to attain that commanding knowledge of the subject which is now considered so unnecessary, but which is certainly a rational object of ambition.

Natural order I.—SPINE-BEARERS (in science *Spinigeri*).

The distinguishing character, and that to which I know no exception, is the spine-bearing caterpillar. The chrysalis is more angled than in any other group, and is always suspended by the tail—a character, however, common to this and the following order. The perfect insect has the fore feet imperfect, totally unfitted for walking, and always without claws; but then again this character is not distinctive, since it applies equally to the next order. The British spine-bearers are divided into four families.

Family 1.—SILVER-SPOTTED FRITILLARIES (in science *Argynnidæ*).

The Caterpillars are almost uniformly cylindrical and almost uniformly spiny: they

generally feed separately on violets, or plants of the natural order Violarieæ, the roots of which have strongly purgative properties, and they are almost invariably refused as food by birds. They pass the winter at the roots of the food-plant, or of some neighbouring herbage, either on the ground or near it. They feed principally in the spring, and become chrysalids on the approach of summer. These are humped and angled, and are generally decorated with brilliant metallic colours. The perfect insects have knobbed antennæ; the costal margin of the fore wings is arched, and they have a bold and graceful flight. The colour of the upper side is bright sienna-brown, spotted with black; the under side of the hind wings is adorned with spots of the most brilliant silver. We have six species in this country, all of them included in the genus Argynnis.



1.—Silver-washed Fritillary (*Argynnis Paphia*), Upper side of the Male.

1. Silver-washed Fritillary.—The costal margin of the fore wings is strongly arched, the tip very slightly hooked, and the hind margin very slightly incurved about the middle. The hind margin of the hind wings is scalloped, but not deeply: the colour of the upper surface is a bright sienna-brown in the male, and the fore wings have four longitudinal raised black stripes on the wing-rays, all of them parallel to each other, and also parallel



Upper side of a Variety of the Male, in the cabinet of Mr. Bond.

to the inner margin; they are united by short black bars; there are four similar short black bars near the base of the wing, and two series of roundish black spots parallel with the hind margin: the hind wings have several short transverse black bars near the base, and two series of almost circular black spots parallel with the hind margin. A pair of these black spots intervenes between each two of the wing-rays always without touching them;

but on each of the wing-rays, near its extremity, is a lozenge-shaped black spot. The female differs in being duller in colour, and in wanting the longitudinal black stripes on the fore wings. The fringe is varied. The under side of the fore wings is fulvous, spotted with



Upper side of the Female.

black; of the hind wings greenish brown, but having the appearance of being transversely, and rather obliquely, striped with dull silver. This dull silvery wash forms a spot near the base; a bar before the middle reaching half across the wing, and an oblique bar extending



Upper side of a variety of the Female called *Valezina*.

entirely across the wing from the middle of costal margin to the anal angle; there is also a silvery space parallel with the hind margin.

Var. 1.—There is a remarkable variety of the female of this insect of a dark olive-green colour, to which Esper has given the name



Under side of the Female.

Valezina: in this variety all the usual black spots are visible, and towards the tip are some pale blotches. Nearly the whole of the upper side is shaded with smoky-green, but through this shade all the usual markings are distinctly visible.

Life History.—The egg is laid towards the end of July, and sometimes as late as the beginning of August, on dead leaves or moss, or on the living leaves of dog violet (*Viola canina*) and sweet violet (*Viola odorata*): the female, when engaged in the duty of oviposition, seeks out shaded places under the brush-wood, while the male may be seen sunning himself and displaying his brilliant sienna-brown wings as he rests on the blossoms of the bramble, from which he extracts his favourite food: the young caterpillar, which is hatched in about fourteen days, appears quite black at first, but very soon exhibits the markings which are its characteristics when full-grown; indeed, the fulvous stripe-like markings on both back and sides are perhaps more strongly pronounced at this early period than subsequently when arrived at its full size. In September it descends towards the roots of the herbage, and there, as near as possible to the surface of the ground, spins a loose covering, apparently more for the sake of affording a sure hold for the claspers than for protection; and in this situation it passes the winter months, emerging and crawling up the petioles of its lowly food-plants as soon as the new leaves have made their appearance in the spring. It appears to be full-fed during the third and fourth weeks in May; at that period, if disturbed, it falls immediately from its food-plant, bending its head and leg-bearing segments under its body until they come in contact with its ventral claspers; but the terminal segments remain straight, and are not generally incurved. The head is somewhat scabrous, rather narrower than the second segment, and most decidedly narrower than those which follow; the body is of nearly uniform substance, but slightly attenuated towards either extremity, having the incisions of the segments deeply and clearly marked: there are three spines on each side of each segment; each spine arises from a bulbous base, and is narrowed to a point at the distal extremity, emitting throughout its length a number of ascending bristles; two of these spines on the second segment are longer and somewhat more slender than the rest; they are strictly dorsal, and are seated immediately behind the head, over which they are porrected. The colour of the head is black, delicately reticulated with brown, and having the crown of a still paler brown: the body is black, with two yellowish, approximate, dorsal stripes, each about equal in width to a mediodorsal black stripe by which they are separated; the sides are blackish, adorned with rust-coloured anastomosing lines, extending from spine to spine, in three longitudinal series; all the spines, except two, are rust-coloured, but originate in the black area of the sides; the two excepted are those which project over the head: these are also rust-coloured, with black tips; they originate in the yellowish dorsal stripes already described: the legs and claspers are smoke-coloured. Towards the end of May it attaches itself by the anal claspers to a slight silken coating it has previously spun on the stem of a bramble or the twig of some low shrub, and, suspended with its head downwards, it changes to an obese, humped, and angulated chrysalis, having a divided or eared head, an elevated ridged thorax, and two rows of lateral abdominal tubercles, six in each row, and all having much the appearance of aborted spines, and being very evidently the representatives of the spines so conspicuous in the caterpillar; the two porrected spines on the second segment are also represented by two tubercles just behind the head: the colour is gray, delicately reticulated with darker shades, and often adorned with spots and washes of the most brilliant and glittering metallic lustre.

Obs.—In making my description of this caterpillar I have been greatly indebted to a coloured drawing from the inimitable pencil of Mr. Buckler, who has also most obligingly furnished me with the subjoined more precise information respecting the identical individual he has figured:—"A single whitish egg was

discovered, from a careful scrutiny of a small bit of moss at the foot of an oak in a wood, by the Rev. A. Fuller and a friend of his, who had previously observed a worn female settled on it. The egg was given to me early in August, and by the 1st of September, 1861, it hatched a small black caterpillar, which fed on the dog violet until November, when I could no longer see it on the plant: it had previously been about three lines in length: a fine web seemed drawn about the base of the stem of the plant, over the moss which was potted with it, under a glass cylinder, and placed in a sunny window: I cannot affirm that the web was spun by the caterpillar. In April, 1862, it appeared again on the plant, about four lines in length, and continued to feed well; and on May 5th it had attained about an inch in length, when I took it out to figure, and to change the plant for another. On the 18th May it had arrived at its full growth, when I took a second figure of it, and two days later it had attached itself to the side of the glass cylinder, and became a chrysalis, brown, with burnished gold spots; and the butterfly, a male, appeared on the 30th of June, 1862."

Time of Appearance.—The caterpillar lives through the winter: I have always found the chrysalis in June, and the butterfly is on the wing at the end of that month, or in July.

Localities.—Although it may be seen skimming over a green meadow now and then, or even venturing into a cottage garden, the Silver-washed Fritillary is decidedly a wood insect, and I imagine occurs in almost every extensive wood south of the Tweed; preferring, indeed, the outskirts or the open spaces, but it is truly a native of woods, and its earlier states are spent in deep shade, although when mature it delights to bask in the sunshine, and to feast on the flowers of the blackberry. It is found more or less abundantly in all the English and Welsh counties, from which, through the kindness of correspondents, I have received lists, and its non-appearance as a native of the others implies rather the absence of observers than the absence of the butterfly. It is reported to me from Ireland by the Hon. Emily Lawless, Mrs. Battersby, Mr. Fetherstonhaugh, Mr. Birchall, and Mr. Marsden, as an inhabitant of the counties Dublin, Wicklow, Cork, Kerry, Mayo, and Westmeath: at Glenmore, Crossmolina, and Killarney, it is abundant; and Miss Lawless informs me it is wonderfully abundant in Recess Woods, Connemara, settling in thousands on the brambles; also at Castle Hacket, and in several Galway localities. In Scotland it is apparently rare; but Mr. Birchall informs me he has taken it at Arrocher; and as it occurs not uncommonly in our northern English counties, Northumberland, Cumberland, and Durham, it may be inferred that its rarity in Scotland is rather apparent than real.

Localities of the Variety Valezina:—

Devonshire. This grand variety was first taken in England by Mr. Dale, who captured it in the New Forest; it was added to the list of Devonshire insects by Mr. Rogers, of Plymouth, who took it in Bickleigh Vale.—*Reading's Catalogue.*

Dorsetshire. It occurs at the Caundle Holt, about three miles from Glanville's Wootton.—*J. C. Dale.*

Hampshire. Of the black variety of the female Paphia we captured twenty specimens in the New Forest, besides missing several others.—*H. Ramsay Cox.*

Kent. We met with a fine specimen in a wood near Sturry, in Kent, several years ago; the net caught in a thistle, and consequently the butterfly escaped.—*H. Ramsay Cox.*

2. Dark Green Fritillary.—The costal margin of the fore wings is regularly arched, the tip obtuse, and the hind margin nearly straight; the hind margin of the hind wings is scalloped, but not deeply so: the colour of the upper surface is bright sienna-brown in the male, duller and very frequently suffused with smoky black and metallic green in the female: all the wings are ornamented with black spots in both sexes, and the position of these spots will be best seen and understood by examining the figures: the fringe is spotted. The under side of the fore wings is fulvous,



2. Dark Green Fritillary (*Argynnis Aglaia*), Upper side of Female.

with black spots, occupying the same position as those on the upper side, but smaller and less conspicuous: there are several silvery spots towards the tip of the wing: the hind wings are metallic green at the base, olive-green in the disk, and in the olive-green part



Under side of Male.

are a number (usually fourteen) of silver spots, the exact position of which is shown in the figures; the green space is followed by a band of plain fulvous, and this by a band of seven semicircular silver spots, each surmounted by a crescentic green spot: a narrow brown line



Under side of a variety of the Female called *Charlotta*.

adjoins these semicircular silver spots, and beyond this is a narrow fulvous border on the hind margin.

Var. 1.—The Queen of England Fritillary, *Argynnis Charlotta*. My gifted predecessor, who gave both the English and scientific name

to this variety, considering it to be a distinct species, says: This butterfly, which is very like the preceding (Aglaia), but distinct and much more beautiful, differs in the following characters: the fore wings have but four instead of five costal liturae on each side, of which two are compound, and not one only, as in Aglaia: the hind wings have nineteen instead of twenty-one silver spots, and of these the three anterior ones are thrice larger than in the preceding; the middle one has a black spot towards the base.

LIFE HISTORY.—The EGG is laid in August on the dog violet (*Viola canina*), and the CATERPILLAR emerges in about a fortnight, and begins to feed on the leaves, but does not acquire any considerable size before the autumn, when it retires towards the root of the plant, or conceals itself under dead leaves, and there remains until the following spring, when it again feeds on the leaves of the dog violet. The following description is from the pen of Mr. Buckler:—

"When nearly full fed it measures an inch and five-eighths in length, and tapers a little towards the head, and more towards the anal extremity. It has six rows of black spines branched with short black hairs—namely, on each side, a sub-dorsal, a lateral, and a sub-spiracular row, except as follows: the second, third, and fourth segments have but sub-dorsal and sub-spiracular rows, or four spines on each segment, the sub-dorsal being rather shorter than the others; and on the second segment they are simple spines, leaning over the head and curved slightly backward. All the other segments have six spines in the order before mentioned, slanting a little backwards, and more so on the two last. The head is black, shining, and hairy. The colour of the body a dark, shining, violet-gray, thickly marbled with velvety black; the gray not very conspicuous, except at the segmental divisions and along the spiracular region, where it forms an undulating interrupted line. The slender dorsal line is black, and expands in width near the middle of its course through each segment, and is bordered on each side with a stripe of bright ochreous yellow, which expands in width just in advance of the widest part of the black mediodorsal line; the spiracles are black, delicately margined with gray, and close below each spiracle is a blotch of bright orange-red, connected below with a thin line of orange ochreous, that runs beneath the lowest row of spines; the belly and claspers are blackish brown. When eating it keeps advancing with every mouthful until it has got to the end of the leaf, and then quickly walks backwards to the point of commencement and proceeds as before, always making a quick retrograde movement before again eating its way forward; and these operations are performed with such rapidity that half a large leaf quickly disappears. When its hunger is appeased it usually retires below the leaves or rests on the stalks of the plant. It continues to feed until the first or second week in July, when it spins together four or five of the rather large leaves at the top of the plant, forming a kind of square tent-like enclosure, within which it retires. After the lapse of a week it turns to a CHRYSALIS, suspended by the tail to the underside of a sloping leaf, its surface covered with a circular mass of silk, thickest in the centre, to which the anal hooks of the chrysalis are attached in a horizontal position; the back being so much curved round towards the leaf as to imitate the upper two-thirds of the letter S. It has a deep depression on the back below the thorax, and a square form towards the head; the wing-cases are thick, with prominent edges below; the segmental divisions of the body are well defined, and having on their upper surface two rows of blunt conical projecting points. The colour of wing-cases, head, and thorax is pitchy-black, with some reticulations of brownish-ochreous, visible chiefly at the margins of the wings; the body has the same ochreous tint mottled with brown; the prominent cones are blackish with ochreous points; the spiracles are black. Its whole surface is shining, as though highly varnished."—*Buckler.*

TIME OF APPEARANCE.—The caterpillar lives through the winter; the chrysalis is to be found in June and the butterfly in July.

Localities.—My experience of this insect is that it is of much less common occurrence than the preceding, and also that it selects different situations. I have never observed it in woods; but this must not be supposed sufficient proof that it never occurs in them: its favourite localities are the sides of hills partially covered with the common brakes (*Pteris aquilina*), and having a scattered growth of the mountain violet (*Viola lutea*); and it appears to delight in sand-hills by the sea-side, especially where the marram or sea reed (*Ammophila arenaria*) and sea lyme-grass (*Elymus arenarius*) abound. I have not observed any species of violet to occur commonly in such situations. In Ireland, as I am informed by the Hon. Miss Lawless, it was rather plentiful in the year 1866 in Lyons' Woods, and in one or two places near; and by Mr. Birchall, that it is common everywhere on the sea-coast. In Scotland it appears to be abundant, and has been taken by Mr. Douglas on the shores of Loch Katrine, by Mr. Campbell at Millport, by Dr. Syme at Dollar, and Mr. Birchall in Argyleshire and the Island of Arran. A reference to Mr. Jenner-Fust's paper on the Distribution of Lepidoptera will show that it has a still wider and more northern range. I give below a more detailed list of English and Welsh localities, with the authority for each in italics.

Anglesea. Sea-coast near Beaumaris, on a bank close to the Menai—*E. Newman.*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Brecknockshire. Very common on the ferny hills near Builth, especially on the sloping sides of the river Elan, as Cwm Elan. The counties of Radnor and Brecknock meet at this spot, and this butterfly is equally common in both—*E. Newman.*

Buckinghamshire. Drayton-Beauchamp, Aston-Clinton, Birchland—*H. H. Crewe;* Halton—*J. Greene.*

Cambridgeshire. Ely—*Marshall Fisher;* common some seasons in Horningsea and Quy Fens, near Cambridge—*Thomas Brown.*

Cheshire. Sandhills on the sea-coast—*E. Birchall.*

Cumberland. Barron Wood, near Armaithwaite. Very common in the county and throughout the lake district—*J. B. Hodgkinson.*

Devonshire. Near Newton Abbott—*J. Hellins;* Whitsand Cliffs, Staddon Heights, Bolt Head, Berry Head, Babbington, Roborough Down, Hingston Down, Dewerstone, Exeter, Torquay, Sidmouth, Launceston—*Reading's Catalogue.*

Dorsetshire. Two specimens at Glanville's Wootton very many years since; Lulworth Downs; downs near Abbotsbury.—*J. C. Dale.*

Durham. Woodlands, near Shotley Bridge—*William Backhouse;* Gibside—*William Maling.*

Essex. Southend—*W. H. Harwood.*

Glamorganshire. Common at Llantrissant—*Evan John;* on sand-hills on the coast—*J. T. D. Llewelyn.*

Gloucestershire. Dursley, Painswick, and in most of the hill districts—*J. Merrin;* abundant at Daneway Common and Sapperton—*M. G. Musgrave;* Leigh, Brockley, and other places near Bristol—*Alfred E. Hudd:* not uncommon in the woods above Wootton-under-Edge—*V. R. Perkins.*

Hampshire. Lyndhurst and Brockenhurst—*W. Buckler.* New Forest and other woods—*J. B. Corbin.*

Herefordshire. Hunter's Gate, Oakley Park, common—*F. E. Harman;* Croft and Berrington—*Mrs. Hutchinson.*

Huntingdonshire. Monk's Wood—*J. F. Stephens, F. Bond.*

Kent. East Cliff, at Folkestone. Very plentiful on the slopes behind Dover Castle—*G. H. Raynor;* on the open downs everywhere between Canterbury and the North Foreland—*W. O. Hammond.*

Lancashire. Sand-hills on the sea-coast—*E. Birchall;* common on the sandhills near Blackpool—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. Common in the county—*T. H. Allis.*

Man, Isle of. Taken at Douglas—*E. Birchall.*

Monmouthshire. Rather scarce, Heulli Wood—*George Lock.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Radnorshire. On the ferny hills near Rhayadr—*E. Newman.*

Rutland.—Common in the county—*T. H. Allis.*

Shropshire. On the Wrekin—*C. J. Barrett.*

Somersetshire. Clevedon—*F. D. Wheeler;* Brockley—*W. H. Grigg;* Portishead—*A. E. Hudd.*

Staffordshire. Dovedale and Charnwood—*Edwin Brown.*

Suffolk. Bentley, Stowmarket—*H. H. Crewe;* Sudbury—*John Grubb.*

Surrey. Occurs, but not commonly, at Witley, near Godalming—*C. G. Barrett;* Mickleham—*J. Walton.*

Sussex. Goodwood racecourse—*W. Buckler;* Shancktonbury Ring, near Steyning, abundant; also near Beeching Chalkpit—*J. H. White;* Abbot's Wood, near Hailsham—*C. V. C. Levett;* about Lewes, abundant on the downs between Firle and Seaford—*E. Jenner.*

Westmoreland. In the woods about Windermere, from Bowness to Newby Bridge, in July and August—*J. B. Hodgkinson.*

Wight, Isle of. Bonchurch Downs—*F. Bond;* Ventnor and Parkhurst—*Alfred Owen.*

Wiltshire. Savernake Forest and West Woods; Great Bedwyn—*T. A. Preston.*

Worcestershire. Monkswood—where it must be scarce, as I have only met with one specimen—*J. E. Fletcher.*

Yorkshire. Near York—*Roberi Cook;* abundant on moors and open ground above Cloughton—*J. H. Rowntree;* Scarborough, Wakefield, Sheffield, Leeds—*E. Birchall;* common in oak woods about York, Scarborough, and all the southern parts of the county—*T. H. Allis.*

Localities of the Variety Charlotta.—This variety is either very rare or is not generally distinguished from Aglaia: I have only two localities:—

Bedfordshire. Lately detected in Bedfordshire, and sent me by my friend, Dr. Abbott—*Haworth.*

Cumberland. As common as Aglaia in some districts of Cumberland—*J. B. Hodgkinson.*

Obs.—I have seen but one specimen, the property of Mr. Bond, kindly lent me to figure.



3.—Niobe (*Argynnis Niobe*). Upper and Under side of the Female.

3. NIOBE.—The costal margin of the fore wings is arched, the tip obtuse, and the hind margin rather convex and slightly scalloped; the hind margin of the hind wings is more decidedly scalloped, but still not deeply so; the colour of the upper surface is bright sienna-brown, with the customary black markings; in the male the brown colour extends nearly to the base, as in Adippe; in the female the base is dark brown or black, and adorned with metallic-green reflections, as in Aglaia: beneath, the silver spots of the hind wings are arranged as in Adippe, the supplementary series of minute silver spots being present, but somewhat indistinct; all the silver spots have distinct black borders.

Var. Eris.—All the discoidal silver spots on the under side of the hind wings are replaced by pale ochreous spots, without metallic tints, their black borders being even more distinct than in the type; the submarginal series of minute spots still retain their silvery hue, and the silver also appears in the submarginal lunules.

LIFE HISTORY.—The CATERPILLAR is covered with long branched white spines; its back is dark brown, nearly black, with a rather narrow medio-dorsal white stripe, which is intersected by a thread-like black line; there is a sub-dorsal series of eight oblique or acutely triangular white markings, all of which point forwards: the sides are brown, intersected by two very slender white stripes; the head is dark brown, the legs dark brown, and the claspers reddish. It feeds on the wild heart's-ease (*Viola tricolor*). *Hübner's figure.*

LOCALITIES.—This species is abundant on the Continent. A single specimen was taken in the New Forest last summer by Mr. Gerrard, of Lyndhurst, and was purchased by the Rev. Windsor Hambrough, as recorded in the "Entomologist," p. 351.

Obs.—Mr. Bond (Entom. v. 17) and Mr. A. G. Butler (Entom. v. 28) express an opinion that this species is only a variety of Adippe, but neither of these gentlemen assigns a reason for taking this view of the case. At a recent meeting of the Entomological Society Mr. Albert Müller mentioned that Meyer-Dür had pointed out certain differences between the caterpillar of Argynnis Adippe and Niobe: in his "Verzeichniss der Schmetterlinge der Schweiz," published in 1852, that author states that Argynnis Niobe in Switzerland inhabits only the alpine and sub-alpine regions from 3000—5600 feet above the sea, and that its caterpillar has in the full-grown state a white dorsal stripe and flesh-coloured spines, whilst A. Adippe is not found at a greater elevation than 3300 feet, and its caterpillar has no white dorsal stripe, but a pale-reddish lateral stripe instead. Mr. Müller argued, that though the food-plants of both were various species of violet, until this evidence was rebutted, or unless two different caterpillars produced the same form of butterfly—unless there were dimorphic caterpillars—Adippe and Niobe must be considered distinct species, even though (which he did not admit) the perfect butterflies were undistinguishable. Mr. Butler replied that he was not acquainted with the caterpillars of Argynnis Adippe and Niobe, and his suggestion that the two forms were one species was made from observation of the perfect insects only; he had found the two flying together, and the sexes pursuing one another: he thought the differences between the butterflies, without amounting to specific distinction, might be accounted for by differences in the external conditions to which they were subject. An instance of this kind had lately come under his notice; in India, Captain Lang had been in the habit of taking what at the time of capture he thought were two distinct butterflies, one in marshy land, the other in dry situations, the marsh insect being thickly covered with down, the highland insect not; but Captain Lang was now satisfied that the two were but one species, Callerebia Scanda, which was liable to modification by surrounding circumstances. Entomologists seem scarcely aware how extensive a subject is opened for discussion if they once maintain that two entirely different caterpillars can possibly produce the same species of butterfly.

4. THE HIGH-BROWN FRITILLARY.—The costal margin is arched, the tip rounded, and



4.—High-brown Fritillary (*Argynnis Adippe*). Upper side of the Male.

the hind margin nearly straight: the hind margin of the hind wings is scalloped, but not deeply so: the colour of the upper side is bright sienna-brown in both sexes, and is without that blackish patch at the base of the wings which distinguishes both sexes of



Upper side of the Female.

Aglaia, and the females of Niobe, but is adorned with numerous black spots, as shown in the figure. The under side is fulvous, the fore wings having numerous black spots, as shown in the figure, and generally some square reddish spots towards the tip, and also from three to five silvery spots: the hind wings are nearly of the same ground colour as the fore



Under side of the Male.

wings, the basal portion of the wing having usually fourteen silver spots of various size and shape, as represented in the figure, and outside of these is an irregular series of silver dots, each surrounded by red-brown, and again beyond these is a row of faint silvery semi-



Under side of the Variety Cleodoxa, in the cabinet of Mr. Bond.

circular markings, each surmounted by a red-brown mark of very similar shape: the hind margin is fulvous.

Var. 1. A very rare variety is entirely without the silver spots on the under side, their space being occupied by fulvous spots of similar size. It has received the name of *Argynnis Cleodoxa*.

LIFE HISTORY.—The EGG is laid in August on the dog violet (*Viola canina*), and the young CATERPILLAR emerges in about a fortnight and feeds on the leaves: it ceases to eat early in the autumn, and retires towards the roots of the food-plant, or conceals itself under leaves, remaining entirely out of sight until the following spring, when it finishes its feeding life and prepares to turn to a CHRYSALIS. When full fed it is about an inch and a half in length and stout in proportion; the head is smooth, and about the same width as the second segment; the second segment has two spines pointing forwards over the head and slightly turned upwards at the tip; the third segment has four spines, the fourth segment also four, and the remaining segments, as far at the eleventh, six each; the eleventh has four, and the twelfth four: all these spines are covered with bristly hairs. The colour of the head is almost black; that of the body pale brown tinged with flesh-colour, and having a medio-dorsal white stripe extending from the fifth to the eleventh segment, both inclusive: this stripe passes through a series of nine semicircular black marks, the convex margin of which is directed backwards, and is narrowly bordered with white; the spines are white at the base, and flesh-coloured at the tip.—*Hübner's Figure.*

Obs.—I have no knowledge of the caterpillar or chrysalis except from books.

TIME OF APPEARANCE.—The caterpillar lives through the winter. The chrysalis is found in June, and the butterfly in July.

LOCALITIES.—It seems to occur both in woods and on uncultivated hill-sides, thus combining the tastes of Paphia and Aglaia. In England it is less frequently met with than either. I have no report of its occurrence either in Ireland or Scotland, but give below some English localities.

Buckinghamshire. Drayton-Beauchamp, Aston-Clinton, and Birchland—*H. H. Crewe;* Halton—*Joseph Greene.*

Cumberland. A single specimen taken in Newbiggin Wood, near Carlisle—*J. B. Hodgkinson.*

Derbyshire. Breadsall, Dovedale, Matlock Cromford—*H. H. Crewe.*

Devonshire. Near Newton Abbott—*J. Hellins;* Bickleigh Vale, Roborough Down, Shaugh, Morwell Rocks, Exeter, Torquay, Bovey Tracey, Launceston—*Reading's Catalogue.*

Dorsetshire. Elsington Wood and Caundle Holt, but rare—*J. C. Dale.*

Essex. Rare at Epping—*E. Doubleday;* Colchester, St. Osyth, has been more scarce during the last two or three years than formerly—*W. H. Harwood.*

Glamorganshire. Scarce at Llantrissant—*Evan John;* it occurs in woods at Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Forest of Dean—*J. Merrin;* on and near Daneway Common and at Sapperton abundant—*M. G. Musgrave;* Leigh, Coombe Glen, near Bristol—*F. D. Wheeler;* near Bristol—*Alfred E. Hudd;* Guiting—*Joseph Greene.*

Hampshire.—Common in the New Forest and other Hampshire woods—*G. B. Corbin;* Lyndhurst and Brockenhurst—*F. Bond.*

Herefordshire. Hunter's Gate, Oakley Park—*F. E. Harman;* Croft and Bircher Common—*Mrs. Hutchinson.*

Kent. Fork Common, near Seven Oaks, somewhat abundant—*G. H. Raynor;* Kingswood, Penny pot Woods, Blean Woods—*Hugh A. Stowell.*

Lancashire. Grange in Cartmel—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. Common in the county—*T. H. Allis.*

Monmouthshire. Rather scarce, Heullis' Wood—*George Lock.*

Norfolk. Stratton Strawless—*Charles G. Barrett.*

Northamptonshire. Near Towcester—*Hamlet Clark.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Rutland. Common—*T. H. Allis.*

Shropshire. On the Wrekin—*C. G. Barrett.*

Somersetshire. Brockley—*T. D. Wheeler;* Portishead—*A. E. Hudd.*

Suffolk. Bentley—*H. H. Crewe;* Sudbury—*W. D. King.*

Surrey. Haslemere: not common—*C. G. Barrett.*

Sussex. Shancktonbury Ring, near Steyning, but not common—*J. H. White;* at the Plasket and elsewhere, in the Weald—*E. Jenner;* Abbot's Wood, near Hailsham—*C. V. C. Levett.*

Warwickshire. Rugby—*G. B. Longstaff.*

Westmoreland. Common in the Lake district, especially at Windermere at the end of July and during August—*James B. Hodgkinson.*

Wight, Isle of. Freshwater and near Ventnor—*F. Bond;* Parkhurst, Apse Heath, Newport—*Alfred Owen.*

Wiltshire. Savernake Forest and westwards—*T. A. Preston.*

Worcestershire. Monks' and Shrawley Woods, not common—*J. E. Fletcher;* Great Malvern, scarce—*W. Edwards.*

Yorkshire. Near York—*Robert Cook;* Yedmondale, and on moors near Cloughton—*J. H. Rowntree;* Scarborough and Sheffield—*Edwin Birchall.*



5. Queen of Spain Fritillary (*Argynnis Lathonia*) Upper side of Female.



Under side of Female.

5. Queen of Spain Fritillary.—The costal margin of the fore wings is arched, the tip blunt, and the hind margin slightly incurved below the tip; the hind margin of the hind wings is scalloped, but very slightly: the colour of the upper surface is fulvous brown, not very bright: the base of all the wings is darker, and is clothed with long hair-like scales which have greenish reflections. The whole upper surface of the wings is spotted with black, as shown in the figure: the under side is paler than the upper, the fore wings being adorned with a few silvery spots towards the tip, and having black spots on the disk: the hind wings are adorned with twenty-four brilliant silver spots, of which seven large ones of nearly equal size are arranged round

the margin. Each of these last has a silver dot just above it, and each of these dots is surrounded first by a dark brown ring, and then by a red brown space; between this series of silvery dots and the base of the wing are about ten brilliant silver spots, which are very various in size and shape, but two of them are conspicuously larger than the rest.

LIFE HISTORY.—The EGG is laid in the autumn (August or September) on the wild heartsease (*Viola tricolor*) and other species of violet, and the CATERPILLAR is hatched in about a fortnight: it hybernates when very small at the roots of herbage, and does not reappear until quite late in the spring; it then feeds again on the leaves of the heartsease, and is full fed about Midsummer: it is then about an inch in length; the head is slightly hairy, and the body has several longitudinal series of short conical spines; there are two of these spines on the second segment, four on the third, and six on the following segments; the thirteenth segment has but two, and these are directed backwards: the colour of the head is brown, of the body brown, with a mediodorsal stripe of a dirty white and a side stripe of nearly the same tint, but more inclining to yellow. The spines are yellowish white.—*Sepp's Figure.*

Obs.—I know nothing of this caterpillar except from books.

TIME OF APPEARANCE.—September.

LOCALITIES.—This common continental species has always been considered, and still remains, a great rarity in this country: the English localities are rather numerous, but the number of specimens captured is very small: the maritime position of most of the localities suggests the idea of the specimens having migrated from the Continent: Dover, Ramsgate, Folkstone, Ventnor, &c., seem to support this conclusion; while others, such, for instance, as the celebrated locality at Birch Wood, are so truly inland that we cannot hesitate to believe that the specimens have been bred on the spot where they were captured. I think we may fairly conclude that, like many of our resident birds, such as the goldfinch and skylark, of which thousands of dozens are annually captured on their arrival on our southern coasts, that accessions to the number of Lathonias take place every year. Mr. Birchall informs me that "a single specimen was taken at Killarney, in Ireland, on the 10th of August, 1864, in the lane leading from Muckross to Mangerton, near a limestone quarry on the left of the road;" a very important and interesting fact, since no doubt can now be entertained of the species existing in the Killarney district in a perfectly natural state, although the constant humidity of the atmosphere may interfere with its appearance on the wing. From Scotland I have no report of its occurrence. I record a few of the instances in which the species has been taken in England: they are chiefly extracted from the "Entomologist."

Cambridgeshire. One specimen was taken in 1844 by the side of the road near Newmarket, and one near Fulbourn, the same year, in September—*Thomas Brown.*

Devonshire. One specimen in Roseberry Wood, near Exeter—*Thomas Lighton.*

Essex. I have taken four in different years in the neighbourhood of Colchester, and have seen three others taken, two of them by one of my brothers; Mr. W. Harrington and Mr. Robert Halls have each taken single specimens; others have been taken at Berechurch by the late Dr. Maclean and Mr. Lawrence Black—*W. H. Harwood;* one at Braintree on the 19th September, 1865—*B. Holland;* one at Bury-St.-Edmunds—*A. H. Wratislaw;* three at Southend—*J. Russell.*

Dorsetshire. Two specimens at Swanage in the summer of 1852—*Henry Reeks.*

Hampshire. Ashford, near Petersfield—*H. H. Crewe.*

Kent. One specimen at Easting, and another on Breeze Hill, near Canterbury—*W. O. Hammond;* eight specimens on the flowers of the broad-leaved hawkweed (*Hieracium sabaudum*) near Birch Wood—*B. Standish;* three of these were taken in one year—the others only one during each year; I have often looked for the insect in the same spot when the hawkweed was in bloom, but without success—*E. Newman;* twelve specimens on the blossoms

of thistles in open parts of a wood near Shoreham—*Thomas Price.* Mr. Price presented three of these to the late Thomas Ingall, in whose cabinet I have often seen them—*E. Newman;* three near Dover in the autumn of 1846—*J. J. Weir;* one in a chalk-pit at Cliff's End, about two miles from Ramsgate, on the 17th of September, 1864—*J. J. Weir;* one in a meadow at Darenth Wood, on the 16th August, 1868—*E. Harper;* one at Gravesend on clover blossom, on the 2nd of September, 1868—*D. T. Button;* one at Ramsgate on the 2nd of August, 1868—*W. G. Armstrong;* two the second week in September, 1868, near Margate—*E. Newman;* thirteen near Canterbury the first week in September, 1868—*George Parry;* one at Walmer—*F. O. Standish;* three between Dover and Deal, October, 1868—*H. E. Leslie;* one at Folkstone, 7th September—*Mr. Purdey;* one at Milton, near Gravesend, the latter part of September, 1868—*H. J. M. Todd.*

Norfolk. One specimen at Great Yarmouth—*C. J. Paget;* one at Ormsby—*C. G. Barrett,* one near Norwich—*C. G. Barrett;* two good specimens in October, 1846, at Harleston, near Norwich—*Charles Muskett;* one specimen at Plumstead, near Norwich, on the 2nd of October, 1865—*T. E. Gunn.*

Suffolk. One specimen on the 3rd Sept., at Lavenham, on a small and almost barren bit of pasture land; it was sitting on the blossom of a dandelion; the soil was heavy clay—*W. Gaze;* A. Lathonia was taken by Captain Russell on two occasions, in August, 1859; in the first instance five specimens, in the second two, in a meadow-field on the south-west side of a wood belonging to Mr. T. P. Hitchcock, at Lavenham; the specimens were shown to the late Professor Henslow, whose living of Hitcham is in an adjoining parish; the professor told him they were certainly Lathonia, but added he did not consider them indigenous, but thought they must have been blown over from the Continent.—*Report of Entomological Society,* Feb. 3, 1862; one in a clover-field, near Ipswich, August, 1868—*Garrett Garrett;* one at Stowmarket, in August, 1868—*W. Baker;* one in a clover-field, at Hazlewood, near Aldeburgh, on the 3rd September, 1868—*N. Fenwick Hele.*

Surrey. Mickleham—*William Bennett;* one at Croydon the second week in August, 1868—*E. Newman.*

Sussex. Two taken near Brighton three or four years ago—*Edwin Hellard.*

Wight, Isle of. I took a very fresh specimen on the 20th of October, 1865, in my garden at Sandown, and have heard that four others have been taken at Ventnor since that date—*W. M. Frost;* one at Ventnor on the 21st of October, and another at the same place on the 24th; on the 4th of November, two in the same line of cliff as those last mentioned—*Alfred Owen.*

Yorkshire. One specimen on the west side of Oliver's Mount, Scarborough, in September, 1868—*J. H Rowntree;* one near York—*Edwin Birchall.*



6. Pearl-bordered Fritillary (*Argynnis Eup*
Upper side.



Under side.

6. Pearl-bordered Fritillary. — The costal margin of the fore wings is slightly arched, the tip blunt, and the hind margin very slightly convex; the colour of the upper surface is bright sienna-brown spotted with black: the under side of the fore wings is tawny, approaching to yellow towards the tips, and

adorned with black spots; the underside of the hind wings is tesselated with red-brown, yellow, and silver spots; the silver spots are nine in number, the largest and longest of which is central; there is one close to the body, near the base of the wing, and there are seven semicircular ones forming a continuous series round the hind margin.

LIFE HISTORY.—The females may be observed during the months of May and June busily employed in examining the leaves of the dog-violet (*Viola canina*), for the purpose of selecting one exactly adapted to their taste for the deposition of their eggs. The EGG has been observed by many entomologists; but I have never had the good fortune to possess one, and therefore adopt the description lately published by Mr. Buckler, who, in describing the egg, says it is "of a blunt conical shape, with its lower surface, which adheres to the leaf, flattened; its sides are ribbed: at first it is of a dull greenish yellow colour, becoming afterwards brownish. Towards the end of June the CATERPILLAR is hatched, then being of a pale greenish tint; after its first moult it becomes browner green, and about the middle of July attaches itself to the stem of the plant, and ceases to feed." Mr. Buckler failed in keeping the caterpillar through the winter, but delayed the hybernation of one individual until the end of July by keeping it in a hot sunny window: "it was then half an inch long, black and spiny, with a faint indication of a dull whitish stripe along the sides above the feet." At this stage the caterpillar was killed by mould, and Mr. Buckler's observations unhappily terminated. On the 9th of April, 1868, through the kindness of Mr. G. F. Mathew, of H.M.S. "Britannia," I received a supply of full-grown caterpillars feeding on the leaves of the dog-violet (*Viola canina*), and have thus enjoyed the opportunity of making a careful description. Mr. Mathew informs me they are by no means easy to find; they are seldom to be seen on their food-plant, but generally on a dead leaf in its immediate neighbourhood or a twig above it. They are lively and feed freely when the sun is on them; but they move slowly and feed sparingly when the weather is dull, and at night they are motionless and abstain from food altogether. The full-fed caterpillar rolls in a ring when annoyed, but very soon unrolls, and crawls with considerable rapidity to a place of supposed safety: the head is almost exactly of the same width as the second segment, rough and bristly; the face is flattish and the crown notched: the body is obese, and the segmental divisions are marked with considerable distinctness; the second segment has two dorsal spines directed forwards; between the second and third segments there is a lateral spine directed outwards; on the third segment are two dorsal spines nearly erect; between the third and fourth segments is a lateral spine directed outwards; on the fourth segment are two dorsal spines nearly erect; the fifth and following segments, as far as the twelfth inclusive, have six spines each—two dorsal, and two on each side lateral; the thirteenth segment has four spines directed backwards; all the spines are rough and uneven, especially towards the tip, and are beset with strong bristles; there is no medio-dorsal series of spines, but the dorsal spines constitute two series of eleven each. The colour of the head is black, the two dorsal series of spines are gamboge-yellow at the base and black at the tip; the body is black, very slightly sprinkled on the back with white dots, and having a vague but broad pale stripe on each side, composed of irregular bluish white markings, more or less closely crowded, and each generally having a median black dot: this stripe is often intersected by a slender sinuous black line: the legs are black, the belly and claspers pitchy red. On the 17th of April my specimens spun little silken pads on the grass, and from these suspended themselves in the usual manner and became chrysalids. The CHRYSALIS is obese, the head obtusely eared, the thorax broadly keeled, the wing-cases ample, the anal extremity rather abruptly incurved, almost reaching the end of the wing-cases, blunt, and terminating in two nearly circular disks, which are fringed with very numerous minute hooks; the dorsal surface has two warts on every segment as far as the eleventh inclu-

sive; these seem to be the dorsal spines simply dwarfed, and denuded of their dermal envelope and bristles, which are shed with the rest of the larval covering. The segmental divisions of the chrysalis are clearly defined; the prothorax or collar is narrow, the tippets have each a separate case, terminating in a rather sharp transverse ridge or keel at the base of the fore wing; the mesothorax is very broad, and occupies the same conspicuous position as in the butterfly; the metathorax is rather narrow, and its anterior margin is broadly excavated, the excavation being semicircular; the fourth and fifth segments are narrow, and the remainder have the dorsal area well developed, but the ventral area almost entirely concealed by the wing-cases. The peculiar coloration and situation of spines which I have described in the caterpillar are continued in the chrysalis, so that the larval and pupal segmental divisions in the two can be identified with the utmost precision; the general colour of the chrysalis is gray-brown, the wing-cases having two series of paler dots.—*Newman.*

Time of Appearance.—The caterpillar lives through the winter at the roots of herbage in woods, or under dried and fallen leaves: the chrysalis is to be found on the dog violet in April and May, and the perfect insect flies in May and the beginning of June.

Localities.—One of the very commonest of wood butterflies in England: it is included in every county list I have received through the kindness of correspondents, except Derbyshire, and in a very ingenious table compiled by Mr. Jenner Fust, and published in the "Transactions of the Entomological Society," it appears in all the numerous sub-provinces into which he has divided Great Britain, with the single exception of Cornwall, in which county, however, the species abounds in some localities, such, for instance, as St. Martin's Wood, near Looe, where it is taken by my valued correspondent, Mr. Clogg. It swarms in the London district, as in Darenth and Birch Woods, and is equally abundant in Northumberland and Durham. I am not aware of its having been found in Ireland, but I have fine examples from Scotland, where it has been taken by Dr. Syme, Mr. Birchall, Mr. Eccles, Mr. Chapman, Dr. Buchanan White, and others. The last named gentleman says:—"It does not appear to be a common species in Perthshire; it has been found in Scone Woods, near the locality for *Moneses grandiflora*, and at the Bridge of Allan. It seems to be more common in the northern than in the southern parts of Scotland, occurring in the same kind of places as *Argynnis Selene*, but generally making its appearance earlier in the season, in fact, about the middle of June; when Selene is most abundant, the flight of Euphrosyne is nearly over.—1868, June 5; 1869, June 4."



Small Pearl-bordered Fritillary (*Argynnis Selene*). Upper side.



Under side.



Under side of a Variety in the cabinet of Mr. Bond.

7. Small Pearl-bordered Fritillary.—The costal margin of the wing is slightly arched, the tip rounded, and the hind margin convex. The colour of the upper surface is bright sienna-brown, spotted with black: the underside of the fore wings is tawny, approach-

ing to yellow towards the tip, and having a large red-brown blotch in this yellow part; the wing is adorned with black spots; the underside of the hind wings is tesselated with red-brown, yellow, black, and silver spots—the silver spots are seventeen in number, the largest of which is central; seven nearly triangular ones form a regular series round the hind margin; there are five between the central one and the costal margin, and five more between the central one and the hind margin: the various spots, whatever their colour, are very distinctly margined with black.

LIFE HISTORY.—The EGG is laid on the dog violet (*Viola canina*) in the summer. I have seen the females busily employed in this occupation in the month of June; the young CATERPILLARS emerge in July and August, and hybernate at the roots of herbage. In spring they are found feeding on the leaves of the violet, and are full grown in May: they are then scarcely an inch in length, the head is about the same width as the second segment, and the body almost uniformly cylindrical, and furnished with six longitudinal series of rather short spines, each of which emits some short bristles, especially from about the tip. The colour of the head and body are dark brown approaching to black, the spines being pale on the basal portion, but black towards the tip. The CHRYSALIS is attached to the stem of the violet leaf, is of a brown colour, and has short conical spines on the segments of the body evidently representing those of the caterpillar.—*Hubner's figure, &c.*

Obs.—I have never possessed this caterpillar, and have, therefore, been compelled to rely on books for my description.

TIME OF APPEARANCE.—In the Kentish woods I have always found that this butterfly makes its appearance from ten to twenty days later than Euphrosyne. I have taken it on the 1st of June, but it is more abundant about the 8th or 10th.

LOCALITIES.—This species is neither so abundant nor so universally distributed in England as Euphrosyne. I have seen no Irish specimens, and none from the Isle of Man; but in Scotland it is more common and more widely distributed than Euphrosyne. Dr. Buchanan White observes it is a common species throughout Perthshire in marshy places, in woods, and on hill-sides: it is probably found in every county in Scotland, where it holds the same place as *Argynnis Euphrosyne* in England.—1858, June 6; 1859, June 7; 1860, July 12; 1867, June 19; 1868, May 16; 1869, June 23. The undermentioned English localities may be noticed:—

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp, Aston Clinton, Buckland, Claydon—*H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Near Cambridge—*F. Bond.*

Cornwall. Abundant in St. Martin's Wood, near Looe—*Stephen Clogg.*

Cumberland. Abundant in Barron Wood and in many other localities—*J. B. Hodgkinson.*

Devonshire. Newton Abbot—*J. Hellins.*

Dorsetshire. Glanville's Wootton (but rare of late years), Parley, &c.—*J. C. Dale.*

Durham. Appears abundantly about June, and frequents most of our woods, Gibside, Meldon Park, &c.—*George Wailes;* Common at Shull—*William Backhouse.*

Essex. Epping—*E. Doubleday;* Colchester, but not so common now as formerly—*W. H. Harwood.*

Glamorganshire. Common at Llantrissant—*Evan John;* Common at Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Forest of Dean—*J. Merrin;* Park Wood, near Stroud—*M. G. Musgrave;* Guiting—*Joseph Greene;* Bristol—*Alfred E. Hudd.*

Hampshire. Lyndhurst and Brockenhurst—*F. Bond;* Grange, Butsee Hill, &c.—*H. Moncreaff;* Bramshott—*C. G. Barrett;* in the county, but not so common as Euphrosyne—*G. B. Corbin.*

Herefordshire. Occurs frequently on the outskirts of our woods at Leominster—*Mrs. Hutchinson.*

Herefordshire. Near Shirley—*F. Bond.*

Huntingdonshire. Monkswood, 8th, June, common—*J. H. White.*

Kent. Very common in all the Kentish woods at the beginning of June; as West Wood, Shooter's Hill, Birch Wood, Joynson's Wood, Darenth Wood, &c.—*E. Newman;* Fork Common, near Sevenoaks—*G. H. Raynor;* on the large woodlands between Barham Downs and the hills extending from Folkstone to Wye—*W. O. Hammond;* in every wood about Faversham and Canterbury—*H. A. Stowell.*

Lancashire. Abundant—*J. B. Hodgkinson.*

Lincolnshire. Common—*T. H. Allis.*

Middlesex. Scratch Wood, near Edgware—*F. Bond.*

Monmouthshire. Common—*George Lock.*

Norfolk. Near Norwich—*C. G. Barrett.*

Northamptonshire. Near Wadenham—*F. Bond;* near Towcester—*Hamlet Clark.*

Northumberland. Near Hexham—*William Maling.*

Nottinghamshire. Very common at Mansfield—*R. E. Brameld.*

Somersetshire. Brockley, Clevedon, and many other places—*A. E. Hudd.*

Staffordshire. Burnt Wood—*Rev. T. W. Daltry,* Charnwood Forest—*Edwin Brown.*

Suffolk. Coomb, Bentley, &c.—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* Sudbury—*W. D. King.*

Surrey. Haslemere—*C. G. Barrett.*

Sussex. Very abundant in woody parts of the Weald, Plashet, Abbot's Wood, &c.—*E. Jenner;* Harting Coombe—*W. Buckler;* Frenchlands—*J. H. White.*

Warwickshire. Rugby—*G. B. Longstaff.*

Westmoreland. Witherslack, abundant—*J. B. Hodgkinson.*

Wight, Isle of. Ryde, Sandown, Parkhurst, Quarr Copse, &c.—*Alfred Owen, James Pristo.*

Wiltshire. Savernake Forest—*T. A. Preston.*

Worcestershire. Monk's Wood, common—*J. E. Fletcher.*

Yorkshire. Near York, plentiful on moors and in fir plantations near Cloughton—*J. H. Roumtree;* Scarborough—*Edwin Birchall.*

Family 2.—Gregarious Fritillaries (in science (*Melitæidæ*).

The caterpillars are almost uniformly cylindrical and almost uniformly spiny, but the spines are short and blunt; they are gregarious through the autumn, winter, and early spring, feeding in company, under a web of their own construction, on the leaves of various species of germander (*Teucrium*), speedwell (*Veronica*), cow-wheat (*Melampyrum*), plantain (*Plantago*), scabious (*Scabiosa*), and other low-growing plants: most of them are confined to one food-plant, but others are equally common on three or four different species. The chrysalids are suspended among the leaves or on the stems of the food-plants, often in little companies of eight or ten together; they are almost without angles, stout, blunt-headed, and remarkable for their beautiful ornamentation of black and orange spots on a whitish ground. The perfect insects have knobbed antennæ; the costal margin of the fore wings is straight, or nearly so, and the flight languid. The colour of the upper surface of the wings is brown, generally of one shade, but sometimes of two, and invariably spotted with black; the underside of the hind wings is tesselated with browns and yellows. They are remarkable for their adherence to very limited localities, most of them spending their lives within a few yards of the spot where the eggs from which they were produced were deposited by their parents. Like domesticated pigeons, they take their little trips about their homestead, but have no propensity to forsake its immediate neighbourhood. We have but three species in this country, all of them at present included in the genus *Melitæa*, but the first species will probably be separated on account of certain peculiarities in the structure of its scales.



8. Greasy Fritillary (*Melitæa Artemis*). Upper side.



Under side.

8. Greasy Fritillary.—The costal margin of the fore wings is almost straight, the tip rounded, and the hind margin rather convex. This species has three colours on the upper surface; burnt sienna brown, dull yellow, and black: the hind margin is black, surmounted in the hind wings by a series of six pale yellow crescents, each bordered with black; above, and adjoining these, is a broad brown band, divided into compartments by the black wing-rays, and in each of these compartments there is an obscure yellow spot in the fore wings, and a black spot in the hind wings. The underside has a greasy appearance, as though oily, or as if the scales had been rubbed off; the underside of the fore wings is dingy brown tesselated with dull black, of the hind wings reddish brown tesselated with dull yellow, each yellow spot being bordered by a black line; parallel with the hind margin is a series of six black dots, each of which is obscurely surrounded with yellow.

Life History.—The eggs, which are somewhat flattened on the crown, are laid on the underside of the leaf of devil's-bit scabious (*Scabiosa succisa*), those leaves nearest the ground being selected for this purpose; the usual period of oviposition is from the beginning to the middle of June. In about a fortnight—that is, from the middle to the end of June—the young caterpillars emerge; they have then black heads and ochre-coloured bodies: almost immediately after emergence they begin drawing together two or three leaves of the scabious or of the neighbouring herbage, and spin a slight gauzy web over the interstices; enclosed in this domicile, they devour, in company, the underside of a scabious leaf, leaving only the epidermis which very soon becomes brown in blotches: as soon as the little community has extracted all the nutriment from the leaf or leaves included within the first enclosure, it moves to other leaves, and by united labours the caterpillars construct a much larger dwelling, sometimes even extending over the leading stem and enclosing the flowering stem of the scabious with its apical flower-bud. Towards the end of summer the caterpillars, then scarcely half-grown, become sluggish, and, ceasing to eat, descend low down among the herbage, where they again spin a silken domicile, beneath the shelter of which they pass the winter: as soon as the plant begins to grow in the spring these caterpillars break up their winter establishment, and each seeks its own provisions independently of the others, and without the protection of a web; indeed, they seem quite fearless of exposure, often indulging in a noonday siesta in bright sunshine on a dried leaf, or in any other exposed situation; this continues until the end of April, when, being full fed, the caterpillar existence terminates: at this period the creature rests in a straight position, but falls off its food-plant when touched or disturbed, and forms a loose ring, the head tucked in and the anal extremity protruding. The head is scarcely narrower than the second segment, semiporrect, and garnished with stiff bristles: the body is obese, and the incisions of the segments are well marked; the second segment has two short bristly obtuse spines on each side below the spiracles; the third and fourth segments have each eight spines; the fifth and succeeding segments have each nine spines, the additional spine being mediodorsal, and the aggregate of these mediodorsal spines forming a mediodorsal series; all the spines are short, obtuse, scabrous, and furnished with bristles. The colour of the head is black; of the body velvety black, sprinkled with circular white dots, which are irregularly ranged in three principal but ill-defined series; one mediodorsal, the others spiracular; each white dot emits a black bristle from its centre; the legs are black; the claspers pale smoke-coloured. It is worthy of remark that in a large number

of these caterpillars under my notice nine out of every ten were infested by ichneumonideous parasites; these emerged from the lepidopterous caterpillars in the caterpillar state, and spinning little silken cocoons outside the lepidopterous caterpillar, fastened down the wretchedly atrophied but still living victim, and, fixing it immovably, left it to perish miserably: the number of these parasites in each caterpillar varied from ten to twenty-six; the cocoons which they spun were of a pale sulphur colour, and were elongate-oval in shape: the majority of them emerged between the 18th and 25th of May, and proved to be a species of *Microgaster*. It would appear that but a small proportion of the caterpillars of *Melitæa Artemis* escape this formidable parasite. The full-fed caterpillar of *Artemis* generally selects some curled leaf or mass of tangled herbage, and thus concealed, spins a slight silken coating over the surface of the object selected, and suspending itself by the anal claspers, changes to a chrysalis, which hangs in the same way. The CHRYSALIS is short and obese, the head being transversely produced in front and broadly truncate; the base of each wing-case is slightly produced: the back is very convex, its anal extremity bent under towards the extremity of the wing-cases, and the dorsal outline being almost semicircular; the caudal extremity is attached by its little hooks to a slight web spun about the margin of the scabious leaf: the colour of the chrysalis is creamy white, changing, as the time of metamorphosis approaches, to a deep orange, variegated with black and orange markings; the cases of the legs have black markings only, but those of the antennæ are black and orange alternately, the latter colour in very small dots; the back of the thorax has two conspicuous black lunate marks, each having a yellow dot behind it; the eight abdominal segments have each a transverse series of lunate black markings, and behind each of these, and partially enclosed by it, is a bright yellow spot with a nipple-shaped excrescence in the middle; the wing-cases are adorned with black markings. Prior to the final change the chrysalis assumes a darker and richer hue, approaching to dull orange, and exhibiting beneath the wing-cases the colours of the butterfly. I am indebted to Mr. Merrin, of Gloucester, for a liberal supply of this very imperfectly-known caterpillar: the same gentleman has most kindly furnished me with materials for compiling its history.—*Newman.*

TIME OF APPEARANCE.—The butterfly makes its appearance in about fourteen days after the change to a chrysalis; this period, however, depends in some measure on the temperature, a cold April delaying their final change for a few days: if the spring is warm and vegetation forward, the caterpillars have a better chance of feeding up early, and the male butterflies begin to appear the second week in May, most of the females emerging some days later: this butterfly has a slow and gentle flight, and is very easily captured; it delights in damp meadows, and is fond of resting in the sunshine on leaves and flowers with expanded wings, and apparently enjoying the warmth: in cloudy weather it will allow itself to be taken by the hand from a flower on which it is resting, and at no time does it fly to any considerable distance from its birthplace: in the damp meadows near Leominster it occurs year after year in the same spot, and may be met with from the middle to the end of May with the greatest certainty.

LOCALITIES.—Frequents damp meadows in which the devil's-bit scabious grows, and is very widely distributed, but at the same time very local: it may exist in all the English and Welsh counties, but from this peculiarity have escaped notice. I have enumerated a few of the localities below. In Ireland, as I am informed by Mrs. Battersby and Mr. Birchall, it is common, occurring in the county Wicklow, also in Galway and at Killarney; and is abundant at Glen Lough and Cromlyn Bog, in Westmeath, where it is very highly coloured and very various in size; in Scotland it seems rare and local, but has been taken at Dunoon and Oban by Mr. Chapman. Dr. Buchanan White says it has hitherto been found in very few localities in Perthshire, but thinks it probable that it has often been overlooked owing to its very local habits. It has

been taken near Dunsinane, Methuen, and the Bridge of Allan. In the first of these localities the caterpillars have been collected rather commonly. In Scotland it occurs as far north as Forres. Dr. White thinks that Scottish specimens are slightly smaller and darker than English ones. The following are English localities :—

Berkshire. Burghfield, near Reading—*S. C. Bird.*

Buckinghamshire. Drayton-Beauchamp, *H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Ely—*Marshall Fisher;* Whittlesford and in the Fens—*F. Bond;* (it was formerly common near Cambridge, but has not been seen for some years)—*Thomas Brown.*

Cheshire. Near Eastham, but rare—*Edwin Birchall.*

Cumberland. Common in the county; Worton Moss, Newby Cross, and abundant also at Brick House, Sabergham. The caterpillar from this bleak place produces very small dark specimens, and also some beautiful varieties with large canary-coloured spots on the fore wings—*J. B. Hodgkinson.*

Derbyshire. Cromford—*H. H. Crewe.*

Devonshire. Near Exeter—*J. Hellins;* woods at Ivybridge, and near the viaduct at the extreme end of the wood—*G. C. Bignell.*

Dorsetshire. Glanville's Wootton, Middlemarsh Woods, Parley, and other places—*J. C. Dale.*

Durham. Near Castle Eden Dene—*W. Maling;* in the Floss locality, I am informed by Mr. Proctor, Jun., of the Durham Museum, that it is most abundant, the food-plant, the devil's-bit scabious, growing there in great quantity—*George Wailes.*

Essex. Near Epping—*E. Doubleday;* about Colchester, but not nearly so common as formerly—*W. A. Harwood;* Saffron Walden, *W. R. Jeffrey.*

Glamorganshire. Common near Llantrissant—*Evan John;* sparingly in short hay meadows about Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Near Gloucester, but very local—*J. Merrin;* Guiting—*Joseph Greene;* Clifton—*Alfred Ludd.*

Hampshire. Warblington—*W. Buckler;* Brockenhurst—*F. Bond;* Woolmer Forest—*C. G. Barrett;* common near Fordingbridge—*G. B. Corbin.*

Herefordshire. Not common near Leominster—*Mrs. Hutchinson;* I have met with it occasionally in all the damp meadows near Leominster, but not abundantly. I have observed it more particularly in the Caswell fields—*E. Newman.*

Huntingdonshire. Yaxley—*F. Bond.*

Lancashire. Rare—*J. B. Hodgkinson.*

Lincolnshire. Common in the county—*T. H. Allis.*

Middlesex. Kingsbury—*F. Bond.*

Monmouthshire. Very common near Heullis' and St. Julian's Woods—*George Lock.*

Norfolk. Near Aldeby, but confined to a few marshes—*W. M. Crowfoot.*

Northamptonshire. Aldwinkle, near Wadingham—*F. Bond;* near Towcester—*Hamlet Clark.*

Oxfordshire. Stow Wood and Bayley Wood—*W. H. Draper.*

Somersetshire. Clevedon—*A. E. Ludd.*

Staffordshire. Craddock Moss—*T. W. Daltry;* Charnwood Forest—*Edwin Brown.*

Suffolk. Near Stowmarket—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* Haverhill—*W. Gaze.*

Surrey. Haslemere, irregularly—*C. G. Barrett.*

Sussex. Foxborough Marsh—*W. Buckler;* abundant in the forest near Wych Cross—*E. Jenner.*

Westmoreland. Rare at Witherslack—*J. B. Hodgkinson.*

Wight, Isle of. Very local, but abundant where it occurs, damp meadows—*James Pristo;* Ventnor—*Alfred Owen;* Sandown—*F. Bond.*

Wiltshire. Clatford, and near Great Bedwyn—*T. A. Preston.*

Worcestershire. Meadows at Hambleton and Oddingley—*J. E. Fletcher;* formerly abundant at Great Malvern, but seems to have disappeared since the drainage—*W. Edwards.*

Yorkshire. Near York—*Robert Cook.*



9. Glanville Fritillary (*Militæa Cinxia*). Upper side of Variety in the cabinet of Mr. Owen.



Under side.



Under side of a Variety in the cabinet of Mr. Bond.



Under side of a Variety in the cabinet of Mr. Wellman.

9. Glanville Fritillary.—The costal margin of the fore wings is very nearly straight, the tip rounded, and the hind margin very slightly convex; the hind margin of the hind wings is waved; the colour of the upper surface of all the wings is rich fulvous brown; the fore wings have several short bands at the base, four transverse irregular zigzag bars parallel with the hind margin, and all the rays black; the intersection of the transverse bars and longitudinal rays dividing the brown colour into several series of compartments of different figures: the hind wings have much the same character, except that each of the brown spots in the second row, counting from the hind margin, has a black dot in the middle; the fringe is alternately black and yellow, the yellow colour being excessively delicate, often approaching to white, even in recent specimens, but in faded specimens it appears white: the underside of the fore wings is fulvous, the tip yellow, with a few black markings: the underside of the hind wings is yellow, with two very irregular transverse fulvous bands; in the yellow base of the wing are six black dots; then follows the first fulvous band very much contorted, and its margin bounded by a black line; next comes a yellow band, in which are six or eight black dots; then the second fulvous band, margined like the first with black, and containing seven black dots; lastly, the marginal band is yellow, and contains six or seven crescent-shaped black marks.

The variety of the under side is so excessive, and, indeed, so bizarre, that any description must fail to give a correct idea of any individual specimen; but when the entomologist has an ample row of the insect before him, I trust he will find the description applicable. I am indebted to Mr. Bond, Mr. Owen, and Mr. Wellman for the loan of the beautiful varieties figured.

Life History.—The eggs are laid during May and June in batches on the narrow-leaved plantain (*Plantago lanceolata*), on which plant alone have I seen the caterpillar feeding. At this time of year I found this butterfly in profusion on the side of and beneath the cliff at Sandown, in the Isle of Wight. Many males were settling on the flowers then abundantly scattered along the undercliff, but the females seemed to be almost invariably occupied in the duties of oviposition. Mr. Dawson has added some interesting particulars, which I shall presently give in his own words. The caterpillars are extruded from the egg in August, and after feeding for a month or two,

the time being longer or shorter according to the weather, they spin a tent, under shelter of which they pass the winter. This tent is very compact and almost of a globular figure, the caterpillars in each mass varying considerably in number. I have found between fifty and sixty in a single mass, but in other masses not more than a dozen. The web is very ingeniously constructed, as Mr. Dawson has described; the blades of grass, as well as the leaves and flowering stems of the plantain being inwoven, and thus rendering the mass firm and compact. The caterpillars when examined in the winter are about a third of an inch in length, and directly they are disturbed roll up into little balls. In the spring they leave their winter quarters, and then may be seen migrating towards the higher part of the cliff, where they feed on the same species of plantain, but not so much in company, nor have they any longer the protection of a web. When full fed they fall off the food-plant and roll into a tight compact ring if disturbed. The head is distinctly exserted and distinctly notched on the crown. It is hairy, and obviously narrower than all the other segments, except the second and thirteenth. The body is obese and slightly decreasing in size at the extremities, the incisions of the segments being distinctly marked. On each segment are eight warts in a transverse series, and each is prolonged into a pointed conical process with rugose surface, and seated in the midst of a fascicle of short stiff radiating bristles. The head is red and shining, its hairs black: the body is intense velvety black, with belts of pure white dots in the incisions between the segments; its hairs are intensely black; the legs are pitchy black; and the claspers dull red. At the end of April it attaches itself by the tail to the stem of the plantain, almost close to the ground, and there changes to a short stout chrysalis, which is of a very dark colour and almost smooth. I have found dozens of the chrysalids in company. The insects remain but a short time in the chrysalis state, rarely more than a fortnight, sometimes less.—*Newman.*

Time of Appearance.—The caterpillar lives through the winter; the chrysalis is found at the end of April and beginning of May, and the butterfly continues to emerge and appear on the wing during the whole of May and June; but it is undesirable to define too closely the duration of either state, for when I had the pleasure in 1824, in company with my friends, George Waring, of Bristol, and Waring Kidd, of Godalming, of discovering the now celebrated locality at the Undercliff, Isle of Wight, we found the caterpillars, chrysalids, and butterflies equally abundant at the same time. With a feeling of triumph that I well recollect I recorded the discovery of this beautiful butterfly in the pages of "London's Magazine of Natural History," then in the zenith of its glory, now a mere memory of the past. Twenty years later, the Rev. J. F. Dawson sent me a most interesting account of the same butterfly and the same locality, and I will copy his letter here, even at the risk of some little repetition.

"As this fritillary is rare in almost every part of the kingdom, some account of its favourite haunts and habits may not prove uninteresting. It cannot be accounted by any means common here, being confined to a few localities only, though where it does occur, it is in general to be found in some abundance. It is not to be expected in cultivated districts, but breeds on steep and broken declivities near the coast, which the scythe or the plough never as yet have invaded, and in such spots it may be met with, earlier or later in May, according to the season. Near Sandown, on the side of the cliff, there is one of these broken declivities, occasioned by some former land-slip, covered with herbage, which slopes down to the beach. A pathway leads to the base. On the 9th of May, 1844, a hot, sunny day, each side of this pathway was completely carpeted with a profusion of the yellow flowers of the common kidney vetch or ladies' fingers (*Anthyllis vulneraria*, var. *maritima*), when I visited the spot; and these flowers were the resort of an abundance of these fritillaries, which fluttered about them, or rested on their corollas, expanding and sunning their wings, and presenting a most charming picture of

entomological loveliness. The great abundance of the narrow-leaved plantain, which also grows there, affords food for their caterpillars. The spring of last year (1845), on the other hand, was so very backward, that on visiting that locality at a date some fortnight later than the above, so far from either flowers or butterflies being visible, the caterpillars were still feeding, and I could discover but few chrysalids. These latter are found adhering, just above the surface of the ground, to the knotted stems of the plantain, which here consists of aged plants, each with but a few stunted leaves; and occasionally on the underside of large stones which have fallen from the cliff; and they are suspended and partly surrounded in the latter case with a fine web. They are also generally to be found in pairs. The caterpillars evidently prefer these stunted plants, for at the base of the declivity, where the plantain grows luxuriantly, not one is to be seen. They are black and spiny, with red heads and legs; being hatched in August they pass the winter in societies, under a kind of tent, formed by a compact web, brought round and over the stems of grasses. I have found several of these societies on the 27th of August, the individuals which composed them being about a quarter of an inch long, rolled up like little balls. All these societies occurred at the base of the declivity, where the herbage grows most luxuriantly; and when the caterpillars have attained sufficient strength in the spring, they are invariably seen ascending towards the higher parts of the slope. And herein I imagine that I recognize a beautiful instance of natural instinct, both in the butterfly and caterpillar. The former deposits its eggs low down in the declivity, where the young brood may rest most securely, sheltered and least exposed to the wintry storms; but when the caterpillars are sufficiently advanced in growth, they ascend to the higher parts of the steep, and feed and undergo their transformation. Were the chrysalis formed below, they would probably have too much moisture and too little sun; whereas, by being formed higher up, they have a sufficiency of both to bring them to maturity. This butterfly is single brooded; but there is a succession of them, varying in duration according to the season. The earliest date on which I have met with it is May 1st—the latest in July; but in the latter case the specimens were bred in captivity. I never remember to have seen it so late in the state of liberty; not later, indeed, than the middle of June here. They are very difficult to rear from the caterpillars, and those I have bred are not only disclosed much later than in the state of freedom, but are not nearly so fine and perfect. They in general fly slowly and gracefully, except when alarmed, gliding gently from flower to flower. I have taken as many as two dozen without moving from the spot where I stood, as they successively visited the stems of the grasses round me. This fritillary was much less plentiful last season than heretofore; and in some of its former haunts has quite disappeared. It has many foes; for besides the march of improvement in cultivation which gradually invades its haunts, the same natural causes which promote its abundance also multiply its enemies. Two necrophagous beetles, *Silpha obscura* and *S. tristis*, destroy the caterpillar; and a large ground spider, very numerous in the spots which it frequents, feeds on the perfect insect; it lies in wait till the butterfly alights on the low plants, or on the ground, then rushing forward, seizes it by the neck, and holds it captive with such tenacity, that both insects may almost be pulled in pieces ere it will relax its grasp."

Time of Appearance.—The caterpillar lives through the winter; the chrysalids are to be found in May and June, and the butterflies are on the wing in the same months.

Localities.—Few species of butterfly are more restricted in their range than this. I know of but three counties where it has been found, as under:—

Hampshire. Near Brockenhurst, in the New Forest—*J. C. Dale.*

Kent. Cliffs near St. Margaret's Bay—*W. O. Hammond.*

Wight, Isle of. Undercliff, near Sandown, discovered by *E. Newman* in 1824; Sandown—*J. F. Dawson* in 1844; plentiful in the

chalk, also occurs on the tertiaries—*James Pristo;* Brook Chine—*F. Bond;* Ventnor and Newport—*Alfred Owen;* Carisbrook Castle, Blackgang Chine, and Freshwater—*J. C. Dale.*

Wiltshire. Near Great Bedwyn, very rare, Rev. J. W. Lukis—*T. A. Preston.*



10. Heath Fritillary (*Melitæa Athalia*). Upper side.



Upper side of a Variety in the cabinet of Mr. Bond.



Two Upper sides and one Under side of Varieties in the cabinet of Mr. Bond.



Under side.

10. The Heath Fritillary.—The costal margin of the fore wings is very slightly arched, the tip rounded, and the hind margin rather convex; the hind margin of the hind wing is waved; the colour of the upper side is deep fulvous brown, the longitudinal rays and a number of transverse bands being black, but there is no row of black dots parallel with the hind margin of the hind wing. The underside has the central part of the fore wings bright fulvous; the costal margin, the hind margin, and the tip yellow; the whole beautifully adorned with black markings, more particularly a double series of black arches along the hind margin; the hind wings are beautifully tesselated with bright fulvous and yellow of two shades, arranged in bands, and divided into variously-shaped spots, every spot being surrounded by a distinct black line; first, there is a double and very slender scalloped marginal black line, then a row of yellow crescents, then another single scalloped black line, then a row of half-moon-shaped yellow spots, then a third scalloped black line bordering the yellow spots, then a row of red-brown crescents, often having the yellow and brown colours mixed and confused, but bordered with a fourth scalloped black line; then follows a band of eight large yellow-white black-bordered spots across the middle of the wing; above this is a very irregular band; and at the base of the wing are five large, yellow-white, black-bordered spots of very irregular form, and mixed with other dark brown markings equally irregular.

Life History.—The eggs are laid in July on the narrow-leaved plantain (*Plantago lanceolata*), the broad-leaved plantain (*Plantago major*), the wood sage or wood germander

(*Teucrium scorodonia*), and the germander speedwell (*Veronica chamædrys*); and the CATERPILLARS, emerging in about fourteen days, feed on these herbs for a few days, or, if the weather is congenial, a few weeks, and then hybernate at the roots of these plants: at the end of April they reascend the plants, feeding more copiously than in the autumn, and crawling up any elevated object, they may be found resting in the full blaze of the meridian sun, which they appear particularly to enjoy. I kept my specimens on a plant of the narrow-leaved plantain, and covered with a bell-glass; in the middle of the day I always found they crawled up the flowering-stems of the plantain, and I was particularly struck with the resemblance of the caterpillars to the flowers of this plant, a resemblance which perhaps serves as a protection against the birds, which at this period of the year are constantly on the look-out for caterpillars wherewith to feed their young. The head of the full-grown caterpillar is semiporrect and fully as wide as the second segment; it is scabrous and bristly; the second segment is dorsally scabrous and bristly, and having two conical spines on each side, the spines being armed with bristles; the third and fourth segments have each eight conical spines, two small and slender ones on each side close to the leg, and the others stouter and nearer the back; the following segments, from the fifth to the eleventh, both inclusive, have each nine conical spines, one of them being medio-dorsal; the twelfth has two medio-dorsal spines placed longitudinally, and three others on each side; the thirteenth has four spines, forming an irregular quadrangle, and all pointing backwards: all of these conical spines are closely beset with short stiff bristles. The colour of the head is black, the scabrous points being white: the dorsal surface of the body is velvety black, sprinkled with snow-white dots; the spines in the medio-dorsal series are pale orange at the base and white at the tip; those of the next series on each side are deeper orange at the base and white at the tip; all the others are pure white, but the bristles of the spines are black; the legs are pitchy black: the belly and claspers are smoke-coloured, indistinctly tinged with pink. My specimens changed on the 22nd May to very short and obese CHRYSALIDS, the head being transversely produced in front and broadly truncate, the base of each wing-case is also slightly produced; the body is very convex, its anal extremity bent under towards the extremity of the wing-cases, and the dorsal outline being almost semi-circular, the anal extremity attached by minute hooks to a slight web spun by the caterpillar on the edge of the plantain-leaf; the colour is creamy white, variegated with black and orange; the cases of the legs are adorned with black markings only; the back of the thorax has two conspicuous black markings, margined with orange; the eight abdominal segments have each a basal dorsal band, alternately orange and black, and very ornamental; the last segment is orange. I am indebted to Mr. Bignell for a most liberal supply of these caterpillars.—*Newman.*

TIME OF APPEARANCE.—The caterpillar lives through the winter. The chrysalis is to be found at the end of May and first fortnight in June. The chrysalis state lasts about twenty days.

LOCALITIES.—This species is extremely local, but abundant where found: it frequents open places in woods, particularly where the herbage is stunted and where heath occurs. Mr. Tress Beale observes that it is fond of basking on thistles, and that when taken it feigns death, falling into the collector's net in an apparently inanimate state, closing its wings and contracting its legs. Mr. Birchall found this species abundant at Killarney, in Ireland, but I am not aware of its having been detected in Scotland, The following are the only English localities with which I am acquainted:—

Buckinghamshire. Near Halton—*Joseph Greene.*

Cornwall, St. Martin's Wood, near Looe, sometimes very abundant—*Stephen Clogg.*

Devonshire. At Fordlands, an estate about three miles from Exeter—*E. Parfitt;* near Exeter—*J. Hellins;* abundant near Plymouth

—*Geo. Bignell.* Common, but local, frequenting healthy spots in woods; irregular in appearing; occurs some seasons, though rarely, at the end of May, at others beginning of July. In 1855 the writer bred 120 specimens from caterpillars found feeding on *Plantago lanceolatum* and *Teucrium scorodonia.* The first passed into the chrysalis condition on June 5th, and the butterfly came forth on June 28th, making the chrysalis state to occupy three weeks. A good time to capture this species is from the middle to the end of June. Dartmoor Tramway, Leighmoor, north and west, above and below Plymbridge, Shaughbridge, Ivybridge, Kingsbridge, Totnes, Tavistock, Exeter, Torquay—*J. J. Reading.*

Essex. Colchester—*Edward Doubleday;* now restricted to one wood—*W. H. Harwood.*

Gloucestershire. Guiting—*Joseph Greene.*

Kent. Blean Woods, near Canterbury, abundant—*W. O. Hammond.*

Staffordshire. Burnt Wood—*J. B. Hodgkinson;* abundant in one locality in South Staffordshire—*J. Hardy.*

Suffolk—Brandeston and Playford—*Joseph Greene.*

Sussex. Very abundant in Abbot's Wood, near Hailsham—*E. Jenner* I have found Athalia so abundant in Abbot's Wood, that I have had ten in the net at one time. The earliest date is the end of May. They are very fond of resting on low herbage and rushes. There is one spot in the wood where they are unusually numerous—*C. V. C. Levett.*

Wiltshire. Near Great Bedwyn, Rev. J. W. Lukis—*T. A. Preston.*

Family 3.—Angle-Wings (in science (*Vanessidæ*).

The caterpillars are spiny, and of uniform thickness throughout; they are often gregarious, feeding in large companies, and generally on plants of the natural order *Urticaceæ* as formerly constituted. I am aware that some of these plants, as the elmworts, now form a separate order, under the name of *Ulmaceæ*, and others, as the hempworts, another separate order, under the name of *Cannabinaceæ*, to which the hop belongs; but our insects disregard these technical alterations, and retain their partiality for this tribe of plants, whatever name they may assume in our systems: some of the species are, however, less restricted in their tastes, and eat a variety of plants. The chrysalids are always angulated, the head always eared, the points sharp and salient; they are always suspended by the tail. The perfect insect has but four perfect legs, the anterior pair wanting the claws and being unfitted for walking: the wings are angled, in some species remarkably so. We have three genera inhabiting Britain—*Grapta*, *Vanessa*, and *Pyrameis.*

11. The Comma (*Grapta C-album*).

11. The Comma.—The hind margin of all the wings is angled and deeply indented, more remarkably so than in any other English butterfly: the colour of the upper side is sienna-brown with a broad band of redder brown along the hind margin of all the wings: the fore wings have seven darker brown spots, the three largest on the costal margin, and the two smallest on the very centre of the wings: the hind wings have three brown spots near the base, and a band of red-brown spots parallel with the marginal band. The underside is clouded brown, and in the very centre of each hind wing is a pure white and very distinct mark, which some say resembles a comma, others compare it to the letter C; it is somewhat like both of these, and hence the names of White C butterfly, and Comma butterfly.

Obs.—There are three very constant varieties observable in the colouring of the underside of the species, the characteristics of which may be described as repletion, variety, and depletion: in the first the brown is dark, dull, and uniform; in the second it is richly varied with different shades of brown and metallic green; and in the third the colour seems partially bleached, and assumes a tinge of fulvous yellow. Mr. Dale, one of our best lepidopterists, regards the first and third of these varieties as a first and second brood. It would be an interesting and noteworthy fact if it could be shown that the generations



11. Common Butterfly. Upper side.



Under side.

alternate in this manner; but it would be no anomaly should this prove to be the case.

Mrs. Hutchinson, of Leominster, who is perhaps better acquainted with this butterfly than any other entomologist in the kingdom, considers the uniformly dark-brown specimens to be females, and the richly varied specimens to be males. Accepting these views as correct, there still remains a little difficulty in the extreme uniformity of colouring in all the fulvous or vernal specimens: these are certainly not all of one sex.

Life History.—The egg is laid in May by hybernated females on the hop (*Humulus lupulus*) and red-currant (*Ribes rubrum*), both in a state of cultivation, and on the elm in the semi-domestic position of a hedge-row. The caterpillar, when full grown, is obese in its form and slow in its movements. The head is slightly porrected, scabrous, and furnished with two conspicuous compound spine-like horns, one of which originates in the upper middle of each lateral plate of the head; these horns are quinquefid at the extremity, one division pointing directly forwards, the others ranged round the base of the first and pointing in four different directions; the ocelli are crowded together at the mouth, and each stands at the extremity of a short pedicel. The body is very stout; the second segment is no wider than the head; the third and following segments are twice that width, and very robust, and the interstices between them are very deep and clearly defined; the second segment is without prominent spines, but has several minute bristle-bearing warts; it is black, with pale red-brown lines; these are somewhat transversely disposed on the back, but longitudinally on the sides; there are seven rows of strong branched spines on the body; four of these rows begin on the third segment, the other three, namely, the medio-dorsal and the lowest, on each side, begin on the fifth: the medio-dorsal series consists of eight spines, and each medio-dorsal spine is slightly in advance of that next to it on each side; the other series consist of eleven spines each; the twelfth and thirteenth segments have each but two spines. The colour of the face is velvety black, but adorned with many paler markings, two of which, originating on the crown, pass obliquely down the face to each side the clypeus: the general colour of the body is gray, interspersed with red-brown; there is a broad medio-dorsal stripe of pure white, commencing on the seventh and ending on the twelfth segment in an obtuse point; the last segment has also a large white spot on each side: the spiracles are exactly intermediate in situation between the second and third lateral series of the spines; they are black and surrounded with white, and the white again with black, and finally the black with red-brown: the space below the spiracles is delicately reticulated with gray; the spines which emanate from the white stripe are also white; those of the third or lowest lateral series, also those of each series as far as the sixth segment inclusive, are pale brown; those of the other lateral series from the seventh to the extremity are white at the tips and pale brown at the base: the ventral

surface is black, irrorated and reticulated with gray and red-brown: the legs are black and red-brown: the claspers red and gray. When full-fed it spins a little hillock of white silk on one of the ribs or on the petiole of the hop-leaf, or on the stem of the hop-plant, or on the hop-pole, or on the leaf-stalk of the currant; and, attaching itself thereto by its posterior claspers, it hangs head downwards, and is transformed to an angulated CHRYSALIS; the head is deeply notched, and the two horns or ears, containing the palpi, are distant, pointed, and curved towards each other at the tips; the back of the thorax has a central elevation laterally compressed and very thin; the sides of the thorax have two blunt protuberances; there is a deep dorsal excavation between the thorax and abdomen; the back has three series of raised points, and on each side are two such series; the points on the medio-dorsal series are small and inconspicuous, those of the next series on each side are large and prominent; the first of the lateral series is above, the second below, the spiracles; both are inconspicuous; the sides of the body, at its junction with the thorax, are much bulged, making this the broadest part of the chrysalis; the anal segment is long and slender, and terminates in a cluster of minute hooks, by which it is suspended from the web; the colour is umber-brown, delicately reticulated with black lines; on the back, in the depression between the thorax and body, are three or more blotches of beautifully burnished silver.—*Newman.*

TIME OF APPEARANCE.—The CATERPILLAR is found on the hop and red currant in July and August, and the chrysalis in September; the butterfly occurs most abundantly in September and October; it feeds on the fruit of the bramble and on plums, and is very fond of settling on the blossoms of the thistle; but although this season is the most prolific one for this butterfly, I have repeatedly seen it in the spring, after hybernation, and also in June, July, and August. An idea seems prevalent that there are two broods in the year, the first emerging from the chrysalis in June and July, the second in August and September. I think this is a mistake; I have been able to obtain no satisfactory evidence of any caterpillars prior to those so abundant in the autumn months about the season of hop-picking.

LOCALITIES.—A species of very capricious habits in regard to geographical range in this country, in some localities being a constant resident, in others appearing and disappearing at intervals. Mr. Birchall has recorded its occurrence at Powerscourt in Ireland, but I have no knowledge of a Scotch specimen. In England and Wales it may be called local rather than rare. A noticeable feature in its distribution is its absence from what may be called maritime lists, as those from Norfolk, Suffolk, Kent, Sussex, Isle of Wight, Dorsetshire, Devonshire, and Cornwall: this absence from the lists is not sufficient evidence of the butterfly's not occurring there, but certainly of its great rarity, or it could not have escaped the notice of entomologists: in the midland counties, on the contrary, it is of frequent occurrence, and in some of them absolutely abundant; then, again, the cultivation of its food-plant, the hop, does not seem to exercise that influence on its choice of localities that might be expected; it abounds in the district where the Worcester hops are grown—namely, Worcestershire and Herefordshire, but it is rarely observed in the Farnham district—namely Surrey—or in the Kent district.

The subjoined list of counties will exemplify this:—

Buckinghamshire. Drayton Beauchamp—*H. H. Crewe.*

Cambridgeshire. One specimen at Ely, many years ago—*Marshall Fisher.*

Cheshire. Occasionally in gardens—*E. Birchall.*

Cumberland. Barron Wood: the caterpillar and chrysalis are sometimes found on the large scabious in abundance—*J. B. Hodgkinson.* [Is not this a mistake?—*E.N.*]

Derbyshire. Breadsall—*H. H. Crewe;* Calke Abbey—*H. A. Stowell.*

(Dorsetshire. Formerly in plenty at Glanville's Wootton, but none have been met with for fifty-four years. The first brood have the

underside yellowish, the second brood dark—*J. C. Dale.*)

(Durham. Formerly at Gibside—*John Hancock;* formerly at Castle Eden Dene and Shull—*William Backhouse;* formerly at Darlington, but now almost, if not quite, extinct—*J. Sang.*)

(Essex. Many years since it used to occur in profusion at Epping; I cannot give any date, but it was when I was a mere child—I should judge about 1817 or 1818. Two or three of the specimens taken then were in existence not many years back—*Edward Doubleday*); two or three have been taken at Colchester, but it is a great rarity—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Glamorganshire. Scarce at Llantrissant—*Evan John;* occurs regularly, but sparingly, at Ynisygerwn—*J. D. T. Llewelyn.*

Gloucestershire. Several places near Gloucester—*Joseph Merrin;* gardens at Pitchcombe near Painswick, and about Stroud—*M. G. Musgrave;* Guiting—*Joseph Greene;* Coombe Glen, near Bristol—*F. D. Wheeler;* Leigh Woods and Stapleton—*Alfred E. Hudd.*

Hampshire. Farlington—*W. Buckler;* occasionally seen, but far from common—*G. B. Corbin.*

Herefordshire. Oakley Park—*F. E. Harman;* Amestrey, Monkland, Westhope, Brierly, Dinmore, Boddenham, and all round Leominster—*E. Newman;* very common in hopyards some years, in others scarce—*Mrs. Hutchinson;* near Bromyard—*W. H. Draper.*

Huntingdonshire. Near Peterborough—*F. Bond;* Monkswood on the 5th and 6th of July, 1832—*James Francis Stephens.*

(Kent. From many sources I learn that this butterfly was said to be common in the Maidstone hop district half a century ago, but I have no more precise or reliable information—*E. Newman.*)

Lancashire. In gardens occasionally—*Edwin Birchall;* Grange—*J. B. Hodgkinson.*

Lincolnshire—*T. H. Allis.*

Middlesex. One taken near Edgware—*F. Bond.*

Monmouthshire. Rather scarce in Huellis' and St. Julian's Woods—*George Lock.*

Northamptonshire. Common near Wadenham—*F. Bond;* near Towcester—*Hamlet Clark.*

Northumberland. I saw a specimen in 1868 which had been taken near Newcastle—*W. Maling.*

Nottinghamshire. It used to be taken near Mansfield, and also at Ollerton and Warsop, but not of late years—*R. E. Brameld;* Newark and the neighbourhood—*George Gascoyne.*

Oxfordshire. Bagley Wood—*W. H. Draper.*

Radnorshire. Frequent about New Radnor, Hindwell, Llandegley, Pen-y-bont, and Llandrindod, settling on the common thistles of the wayside.—*E. Newman.*

Shropshire. Coalbrookdale and Wenlock—*C. G. Barrett.*

Somersetshire. Clevedon—*A. E. Hudd.*

Staffordshire. Swinnerton Old Park—*T. W. Daltry;* Repton Scrubs and Seal Wood, near Burton-on-Trent—*Edwin Brown.* In some years it is far from uncommon at Wolverhampton; ten specimens were taken here in 1867, five of them feeding on ripe damsons—*F. E. Morris.*

Warwickshire. Occasionally at Stratford-on-Avon—*W. G. Colborne;* Rugby—*A. H. Wratislaw.*

(Wight, Isle of. It is reported to have occurred in former years in the island, more especially at Freshwater, but the three excellent entomologists who have heard the tradition—namely, James Pristo, Alfred Owen, and Henry Rogers, possess no further knowledge of the subject.)

Wiltshire. Has occurred once near Marlborough—*T. A. Preston.*

Worcestershire. It occurs occasionally in all parts of the county—*J. E. Fletcher;* formerly abundant at Great Malvern, but now scarce—*W. Edwards.*

Yorkshire. Common at York—*T. H. Allis* (formerly taken at Raincliff Wood, near Scarborough, but not of late years—*J. H. Rowntree*); Huddersfield, rarely and singly—*G. T. Porritt;* Halifax, Sheffield, Wakefield, Leeds—*Edwin Birchall.*



12. Small Tortoiseshell (*Vanessa Urticæ*).

12. SMALL TORTOISE-SHELL.—The hind margin of all the wings is angled; the prevailing colour is bright red-brown; on the costal margin are three large black spots: the colour between the body and the first black spot is red-brown; between the first and second spots, yellow; between the second and third spots, yellow; between the third spot and the marginal band, white; in the very middle of the wing are two small round spots, and on the middle of the hind margin is a large square black spot joining to a yellow spot beyond it; the hind wings have the basal half black, followed by a broad band of red-brown, shaded to yellowish towards the costal margin; all the wings have a brown variegated band round the hind margin; this consists of a scalloped black line, in the indentation of which are semicircular blue spots; outside these spots is a dingy brown space, and a distinct darker line running all the way round, dividing it into two narrow portions.

The butterfly is subject to some very beautiful and striking varieties, all of which have repeatedly occurred. The specimens figured have been kindly lent purposely for this work.



Small Tortoise-shell. Var. 1.

Var. 1.—Is quite without the two spots on the disk of the wing so conspicuous in the ordinary specimens. The specimen figured is in Mr. Owen's collection.

Obs.—This variety was taken at Hawkshead, in North Lancashire, and is alluded to at page 129 of the third volume of the "Entomologist," by Mr. C. S. Gregson, "as the variety *Ichnusa* of Bonelli; the same form being common in Sardinia;" but Mr. Muller, at page 164 of the same journal, says that this form, whether we call it a species or variety, is entirely confined to Mediterranean latitudes.



Small Tortoise-shell. Var. 2.

Var. 2.—Has a black band crossing the middle of the wing. The specimen figured is in Mr. Bond's collection.



Small Tortoise-shell. Var. 3.

Var. 3.—Is altogether abnormal, the form and colouring being entirely altered. This variety has repeatedly occurred both in England and on the Continent. The specimen figured is in Mr. Owen's collection.

Obs.—Mr. Birchall, who has so assiduously collected in the Isle of Man, observed that in that island this species was uniformly much smaller than in England. He has kindly presented me with an interesting series of these dwarfs.

LIFE HISTORY.—The EGGS are laid in the months of May and June, on the leaves of stinging-nettles (*Urtica urens* and *Urtica dioica*), in batches of sixty or eighty, and sometimes a much larger number; the females which perform this duty having survived the winter. The eggs are so much the colour of the nettle-leaves that it is difficult to detect them; they are laid all in a lump, like a bunch of grapes or a handful of gooseberries, and as the late Dr. Maclean, of Colchester, justly observed, have a very singular appearance. Each egg is oblong, and depressed at both extremities; at the upper extremity is a circular operculum, which is pushed off and disappears at the time of hatching; there are generally eight longitudinal keels or ridges extending from the operculum to the base, but this number is not constant, varying to seven and nine. In an average period of fourteen days, but varying according to the temperature, the young CATERPILLARS emerge, and remaining in company, spin together the leaves of the food-plant: as they consume the leaves the limits of their dwelling are extended, and they continue to live in company until fully half-grown; they then separate, and each feeds alone. When full-fed they rest in nearly a straight position, but on being disturbed fall off the food-plant, and lie in a curved posture, the head and tail approaching. The head is wider than the second segment, but narrower than those which follow; it is somewhat notched on the crown, and is covered with spinose points, which vary in size, and each of which terminates in a bristle; the second segment is narrow, and has a transverse series of small spines, each of which terminates in a bristle; the third and fourth segments have each a transverse series of eight spines—two on each side of the belly near the insertion of the leg, very small and inconspicuous; and two others on each side of the back, conspicuous and branched, each of the branches, as well as the central spine, terminating in a bristle; the following segments, from the fifth to the twelth inclusive, have each seven branched spines, one medio-dorsal, the other at regular intervals, the medio-dorsal spine always placed slightly in advance of the rest: the thirteenth segment has four branched spines: the head is black, its warts white: the body has the dorsal surface black and irrorated with yellow dots, each of which emits a slender bristle; these dots are frequently so numerous as to form a broad yellow medio-dorsal stripe, which, however, is always interrupted by a narrow median black stripe: on each side are two yellowish stripes, one above, the other below, the spiracles; the subspiracular stripe is the brighter and more distinct of the two; the spiracles are black and surrounded by a pale ring; the belly is pale, excepting between each pair of claspers, where it is dark, but still irrorated with minute white dots; the spines are generally smoky green, but not unfrequently black; the claspers are smoky green. When full-fed the caterpillar frequently crawls away from its food-plant, and selects a twig or leaf of some neighbouring plant, or the coping-stone of a wall, or a wooden rail or palings, on which to undergo its change to a chrysalis, but it more often prefers the under side of a nettle-leaf; in either case it spins a slight web over the object selected, and, suspending itself therefrom by the anal claspers head downwards, it becomes a rather elongate and sharply angulated CHRYSALIS, which has the head deeply notched on the crown, the points distant and acute; the thorax is dorsally humped; the hump having a median elevated point; on each side of the thorax, near the insertion of the wing-cases, are two rather obtuse elevations; the back has three series of raised points, the median series consisting of six, all of them small and insignificant; each lateral series consists of nine points, three of them thoracic, small and insignificant, the remaining six conspicuous and abdominal; the terminal segment of the body is slightly spoon-shaped, and terminates in a complete fringe of minute hooks, by which the chrysalis is attached to the web: the prevailing colour of the chrysalis is brown, mottled or reticulated with black, and adorned with golden spots and reflexions; the spots generally comprise the lateral spinous processes; about the junc-

tion of thorax and body the reflexions or tints of gold are more extended, sometimes embracing the wing-cases.—*Newman.*

Time of Appearance.—I have found the caterpillars abundantly on nettles in May and July, and I have succeeded in rearing butterflies from both these broods; the chrysalids are found at the end of May and beginning of June, and the butterflies in almost every month in the year, beginning, of course, with hybernated specimens. An interesting note on the commencement and termination of this insect's hybernation, by that most accurate observer, the Rev. O. Pickard-Cambridge, is published at page 299 of the third volume of the "Entomologist." Mr. Pickard-Cambridge says:—"On one of the first Sundays in August last, during divine service, a specimen of *Vanessa Urticæ* flew into the parish church of Winterbourne-Tomson, in which I was officiating. After fluttering in the windows and flying about the church for a short time, the insect settled upon a projecting rafter in a conspicuous place, and remained, with its wings in the usual state of repose, during the remainder of the service. On the Sunday following it was still *in statu quo;* and so, Sunday after Sunday throughout the autumn and winter, evidently never having once moved from its first position. There it was until, on Sunday, the 5th of May, it came off its perch, and was flying briskly about the church when I came away after the conclusion of the service. Its period of motionless repose had thus just been nine months, and it was apparently as fresh in colour and condition as if just out of the chrysalis." Professor Westwood has expressed his surprise that a specimen captured in the spring proved on examination to be a male. I may inform him that both sexes invariably hybernate in the perfect state and reappear in early spring. From the time of the first vernal appearance of these hybernated specimens there is usually a succession of individuals, liable to an occasional interruption about Midsummer. Mr. Tuely records ("Entomologist," ii., 294) that he took a recently hatched specimen on the 6th June, and Mr. Doubleday informs us ("Entomologist," ii., 294) "that in 1865 hundreds of caterpillars were hatched on nettles in a field adjoining his garden towards the end of April; these were full-grown in May, and the butterflies were on the wing in the middle of June: there was not a single caterpillar on the nettles from the third week in May until the first week in July, when swarms of young ones again appeared; these were full-fed early in August, and the butterflies were again on the wing early in September." Thus there are evidently two broods in the year, and June and September may be given as the dates for their appearance. Some of the second brood remain until October in the chrysalis state, and Mr. Clogg has observed the emergence of specimens on the 23rd and 25th of December. The Small Tortoise-shell seems attached to the residences of man, and, like many animals, has its economy modified in accordance with this association.

Obs.—The caterpillars of *Vanessa Urticæ*, and, as I surmise, of the genus *Vanessa* in general, are remarkably exempt from the attacks of ichneumons. Thus I collected last July about forty nearly full-grown caterpillars of this species, and every one of them became a chrysalis and emerged in due time. I observed also in rearing this butterfly, that if from insufficient or inappropriate food the caterpillars have not attained their full size when they enter the chrysalis state, the perfect insects make their appearance with perfect wings, but of a diminutive stature; in this respect differing from moths, which, under similar circumstances, appear with shrivelled and imperfect wings.—*J. R. S. Clifford,* in "Entomologist," vol. ii., p. 132.

Localities.—Distributed with considerable equality over every part of the British Islands. Mr. Birchall simply records that it is "common" in Ireland. Dr. Buchanan White says, "It is as abundant in Perthshire as it is elsewhere, and is found from the sea-level up to the summit of Ben Lawers. It is one of the few butterflies noticed by outsiders, who call it the Emperor Butterfly, the Devil Butterfly, or Witch Butterfly. Scottish examples are larger than English ones."



13. Large Tortoise-shell (*Vanessa Polychloros*).

13. Large Tortoise-shell.—The costal margin of the fore wings is very slightly rounded in the middle, and rather suddenly bent towards the body at the base; the hind margin of all the wings is scalloped and angled, some of the angles being more prominent than the rest, as shown in the figure. The prevailing colour is dull fulvous brown; the fore wings have three large squarish black spots on the costal margin; the spaces between them being lighter than the rest of the wing; there are two small round spots near the middle of the wing, and two larger round spots below these, and at equal distances from the hind margin: the hind wings have a large black spot on the costal margin, and a paler space nearer the marginal band: this marginal band goes round the hind margin of all the wings; it is composed, first, of a black line, which, in the fore wings, is plain, but in the hind wings contains a row of semicircular blue spots; and, secondly, of a dingy brown marginal space, through the middle of which runs a narrow dark-brown line.

Obs.—The pattern of this species is extremely like that of the preceding, but the colours are duller, and it may generally be distinguished by its larger size: there are also two constant differences in the markings: in *Urticæ* the space between the second and third black costal spot is white, while in *Polychloros* it is dull yellow; in *Polychloros* there is a black spot in the anal angle of the fore wing, which is absent in *Urticæ*. It is little subject to variation.

Life History.—In the spring of the year both sexes of this butterfly may be seen toying with each other in our lanes, and occasionally, but less commonly, on the outskirts of woods: impregnation takes place at this season, generally in the month of May, but sometimes as early as April. The ovary of the female is now distended, and the eggs are prepared to receive the fecundating element; in these and other insects the eggs attain their full size and character prior to fecundation. In the autumn, on the contrary, in the very few females I have been able to obtain, there is no distinct appearance of eggs in the ovary; and neither males nor females exhibit indications of the sexual impulse. The eggs are laid in May, on the leaves of various trees. The wild and cultivated cherry (*Prunus cerasus*, the Cerisier and Griothier of the French) seems the tree chiefly selected in France, and whole rows of these trees may occasionally be seen in July entirely stripped of their leaves by the caterpillars of this species. In England the trees selected are the aspen (*Populus tremula*), white beam-tree, whip crop, or white rice (*Pyrus arria*), sallow (*Salix caprea*), osiers (*Salix viminalis* and *S. vitellina*), and more commonly the different species or varieties of elm (*Ulmus*): in gardens it is also found on cherry and pear trees. The eggs are very numerous, some

times as many as four hundred in number; they are crowded together on small twigs or branches of the elm, sometimes completely surrounding the twig and forming what, in the instance of the Lackey Moth, has been called a necklace; the eggs, however, although closely approximate, are not embedded in glue, as is the case in the Lackey Moth, but each egg seems quite unconnected with the rest, although touching it; each has a distinct operculum, which is forced out of its place and is probably eaten by the young caterpillar on its natal day, and also eight longitudinal ridges or keels, which commence near the crown or operculum and terminate at the base, just where the egg adheres to the twig: the number of these ridges is not perfectly constant to eight, as in a few instances I have found only seven, and also in a few instances as many as nine. I am greatly indebted to Mr. Pristo for a specimen beautifully illustrating this curious chapter in the life history of the species. The CATERPILLARS are hatched in a fortnight, and are full grown about Midsummer; at this period they rest in a straight position on the food-plant, and are readily shaken off, and fall to the ground; they have rather a limp and flaccid character, and exhibit scarcely any disposition to assume the ring form. Being laid and hatched in such large companies, the caterpillars remain in close proximity during life, single specimens being very rarely met with. The head is exserted, being manifestly wider than the second segment; its position is prone, its crown slightly notched, and the divisions slightly elevated: the entire surface of the head is scabrous; this character arising from the presence of numerous small warts and elongated papillæ, the length of which is about equal to three times their breadth; the warts and papillæ are intermixed, but the latter predominate on the crown, the former on the cheeks; from the summit of each wart or papilla emerges a slender and slightly bent hair; the body is almost uniformly cylindrical, and is armed with sharp spines on every segment except the second; these spines constitute seven longitudinal series, the first of which is medio-dorsal, and consists of eight spines, namely, one on each segment from the fifth to the twelfth, both inclusive; each spine in this medio-dorsal series, at about half its length, emits a single branch, which is directed forwards in a slanting direction; the first lateral series consists of ten spines: these commence with the third, and end with the twelfth segment; each spine in this series has at least three lateral branches, all of which spring from a point nearly equidistant between the base and tip of the main spine; the second lateral series is composed of rather smaller spines, and each of these is branched much in the same way as those of the preceding series; and again still below this is a third lateral series of eight smaller spines, which begin on the fifth and end on the twelfth segment; these are also branched like those already described; each spine in the second lateral series stands a little in advance of the corresponding spine in the first lateral series, and rather more so in advance of that in the third; the thirteenth segment has four branched spines, forming a quadrangle, and all of these lean slightly backwards; the ventral surface is without spines, and is deeply wrinkled at the interstices of the segments, but not between each pair of legs or claspers; above each leg, or clasper, are a number of longish deflected hairs, and these form a lateral fringe, not particularly distinct. The head is black, its shorter hairs being also black, but the longer ones white; the surface of the body is thickly sprinkled with minute warts, each emitting a hair from the summit; these are gathered into dense groups down the middle of the back, and are there of a pale brown colour, forming a continuous but irregular stripe, which expands to the base of each spine in the first lateral series; this pale stripe is interrupted throughout by a narrow medio-dorsal stripe of velvety blackness; the pale warts also form groups round the base of each spine in the second lateral series, and again a narrow stripe in the region of the spiracles, which are scarcely perceptible; this lateral stripe includes in its course the third or lowest lateral series of spines; on the other parts of the body these minute warts are almost white,

giving the surface a gray appearance; they form transverse series on the sections of the segments; the spines are ochreous as well as their branches, excepting the extreme tips, which are black: the yellowish spines give the caterpillar the appearance of having much more decided yellow stripes than is the case; the legs are black; the claspers pale dingy brown. It changes to a CHRYSALIS suspended by the tail very soon after attaining its full size, and is often found under the coping-stones of walls, on the trunks of trees, and on park palings. The chrysalis has a divided or eared head, the two points being widely separated and acute; the thorax has a short, elevated dorsal keel, and two spines on each side; the body has two series of dorsal spines, each series consisting of six spines. I am indebted to Mr. V. Lewes for full-grown specimens of the caterpillar, sent expressly for this work.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is found in June, about the middle or latter end of which month it assumes the chrysalis state, and the butterflies appear about the middle of July, and remain on the wing about a month, when they retire for the winter.

LOCALITIES.—This butterfly seems to be absent from Scotland and Ireland, but to be generally, although sparingly, diffused throughout the midland and eastern counties of England; I am aware that Mr. Birchall mentions a specimen said to have been seen near Galway in 1861, but it was not taken, and he evidently discredits the *on dit.* In England its rarity in the north and extreme south-west is very noticeable: from Northumberland and Westmoreland I have no record of its occurrence; from Cumberland, Durham, and Lancashire, one from each county; six Yorkshire localities are reported; from Derbyshire, Nottinghamshire, Staffordshire, Northamptonshire, and Norfolk, it is reported as rare; and in Herefordshire, as "not common"; in Cambridgeshire, Huntingdonshire, Warwickshire, Worcestershire, Suffolk, Essex, Hertfordshire, Bedfordshire, Middlesex, Buckinghamshire, it is "not uncommon"; in Kent, Surrey, Sussex, Hampshire, and Dorsetshire it is "common": in Devonshire a dozen localities are mentioned where single specimens have been taken. It is rather a feature in the history of this insect that it occurs singly: in the very numerous records I have received more than half speak of single specimens.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp—*H. H. Crewe.*

Cambridgeshire. Generally.

Cheshire. Eastham—*E. Birchall.*

Cornwall. Near the gasworks at Looe, but very rare; I recollect them much more plentiful—*Stephen Clogg;* Whitsand Cliffs—*J. J. Reading.*

Cumberland. A single specimen taken on the bank of the Solway—*J. B. Hodgkinson.*

Derbyshire. Breadsall—*H. H. Crewe;* Calke Abbey—*H. A. Stowell.*

Devonshire. Scarce near Plymouth—*J. J. Reading,* who mentions a great number of localities within the county where single specimens have been taken; I have seen a single specimen every spring for the last five years on the road from Plymouth station to Plymbridge—*G. C. Bignall.*

Dorsetshire. Glanville's Wootton, rare in the autumn, but more plentiful in the spring—*J. C. Dale.*

Durham. A single specimen at Whitburn, on the 23rd July, 1858—*John Hancock;* a single specimen at Darlington—*J. Sang.*

Essex. The caterpillars were formerly most abundant, feeding on elm at Buckhurst Hill, on the borders of Epping Forest, but I have not seen them for many years—*E. Newman;* very common round Colchester in 1860, the caterpillars feeding on elm, sallow, and osier, now rare—*W. H. Harwood;* Chingford—*W. J. Argent.*

Glamorganshire. Scarce—*Evan John.*

Gloucestershire. Scarce—*J. Merrin;* once near Stroud—*M. G. Musgrave;* a great number of localities in this county have reached me through the kindness of correspondents.

Hampshire. Some years not uncommon in the spring after hybernation—*G. B. Corbin.*

Many Hampshire localities are mentioned by my correspondents.

Herefordshire. Occurred at Leominster in 1858 and 1859—*Mrs. Hutchinson;* Oakley Park, near Hereford—*F. E. Harman.*

Hertfordshire. Many localities—*F. Bond.*

Huntingdonshire. Many localities—*F. Bond.*

Kent. The caterpillars were plentiful on elms by the Fox and Hounds at Darent Wood, in 1830, and the butterflies of very frequent occurrence in Burnt Ash lane, Lewisham, in the spring of 1856, after hybernation—*E. Newman;* the caterpillars were plentiful on an elm tree in Tonbridge school ground in 1869—*C. L. Raynor;* abundant at Faversham, Boughton, and other places, the caterpillars feeding on the white beam (*Pyrus arria*), elm (*Ulmus*), and goat willow (*Salix caprea*)—*H. A. Stowell.*

Lancashire. I have seen one specimen taken at Red Scar, near Preston—*J. B. Hodgkinson.*

Lincolnshire. Common—*T. H. Allis.*

Middlesex. In many localities—*F. Bond.*

Norfolk. Norwich—*C. G. Barrett.*

Northamptonshire. Barnewell Wold—*F. Bond;* near Towcester—*Hamlet Clark.*

Nottinghamshire. Was formerly taken at Mansfield, Ollerton, and Worsop, but not met with of late years—*R. E. Brameld;* at Newark, but not common—*George Gascoyne.*

Shropshire. Wenlock—*C. G. Barrett.*

Somersetshire. Clevedon—*A. E. Hudd.*

Staffordshire. Scarce at Burton-on-Trent—*E. Brown;* one at Wolverhampton—*F. E. Morris.*

Suffolk. Generally distributed.

Surrey. In all parts of Surrey—*S. T. Klein.*

Sussex. I once found the caterpillars in abundance feeding on aspen (*Populus tremula*); they were nearly full-fed, and I succeeded in rearing more than a hundred of the perfect insect—*C. V. C. Levett.*

Warwickshire. Not uncommon; some specimens were taken at Stratford-on-Avon, attracted by the sweets of empty sugar-casks in a grocer's yard—*W. G. Colborne;* Rugby—*A. H. Wratislaw.*

Wight, Isle of. Moderately common in woods—*James Pristo;* a dozen different localities are mentioned by different correspondents.

Wiltshire. At Marlborough, but very uncommon—*T. A. Preston.*

Worcestershire. Taken on three occasions at Worcester—*J. E. Fletcher;* one specimen at Malvern—*W. Edwards.*

Yorkshire. Near Scarborough, Huddersfield, York, Sheffield, Wakefield, and Halifax,—*Edwin Birchall and others.*



14. The White-bordered, called also the Camberwell Beauty (*Vanessa Antiopa*).

14. THE WHITE-BORDERED.—The hind margin of all the wings is angled; the colour a rich puce-brown; all the wings have a broad band of dingy white on the hind margin, and

a row of blue spots just within this band; the fore wings have two whitish spots on the costal margin rather beyond the middle.

LIFE HISTORY.—The EGGS are laid in the spring, after the female has hybernated, on the nettle (*Urtica dioica*), the birch (*Betula alba*), and far more commonly on the white willow (*Salix alba*). The CATERPILLARS are covered with long branched spines: the head is black; the body also black, with a mediodorsal blotch on each segment from the fifth to the eleventh, both inclusive, of a brick-dust red colour. The CHRYSALIDS are angulated, eared, and suspended by the tail.—*Hubner's and other figures.*

Obs.—I have no knowledge of the earlier states of this butterfly except from books; it is a most abundant continental species.

TIME OF APPEARANCE.—Early spring and late autumn. I believe that hybernated specimens are much more common than is generally supposed. The caterpillar and chrysalis states must of necessity occur between the spring and autumn flights, but I have no practical knowledge of this.

LOCALITIES.—I have very great difficulty in defining localities for this insect: on the continents of Europe and North America it is abundant, but its appearance in the British Islands is in the highest degree uncertain, and apparently capricious.

"There is something very extraordinary in the periodical, but irregular, appearances of this species. . . . It is plentiful some years, after which it will not be seen by anyone for eight, or ten, or more years, and then appear again as plentiful as before. To suppose they come from the Continent is an idle conjecture; because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch until some extraordinary but undiscovered coincidences awake them into active life." This sentence has often been quoted with apparent approbation, but I feel considerable difficulty in accepting the solution, because the eggs of the Vanessidæ pass so few days in that state, and would, of necessity, fall with the falling leaves of the willow, and the young caterpillar on emergence would be irretrievably separated from its food-plant.

From Ireland I have a report of one taken at Killarney in July, 1865, by W. G. Battersby. In Scotland also one was taken by the late Charles Turner, in the Ramoch district. I saw this specimen, and have no doubt of its genuineness. Indeed, Turner combined with many eccentricities, and I may say errors, a love of truthfulness in entomological matters that I could always depend on. Mr. Thomas Chapman has information of others at Paisley and Edinburgh. In England its appearances are numerous, almost every county boasting its single individual. Formerly this was not the case. From the way in which Moses Harris writes of this butterfly in England, we are led to suppose that in his time it was regarded as no great rarity. In his "Aurelian" he merely says that it goes through its changes and appears on the wing at the same time as the Peacock. Lewin is more explicit:—

"Three of these beautiful and rare insects were taken in the year 1748, near Camberwell, in Surrey, from which time until the year 1789 we have no account of any being seen in England. The middle of August, 1789, I was surprised with the sight of two of these elegant flies near Faversham, in Kent, one of which I thought it great good fortune to take; but in the course of the week I was more agreeably surprised with seeing and taking numbers of them in the most perfect condition. One of my sons found an old decoy pond of large extent, surrounded with willow and sallow trees, and a great number of these butterflies flying about and at rest on the trees; many of them appearing to be just out of the chrysalis, left no room to doubt that this was the place where they bred. In March, 1790, a number of these insects were flying and soaring about for the space of twelve or fourteen days; and then, as if with one consent, they migrated from us, and were no more seen."

And, again, Mr. Wailes, in his "Catalogue of the Lepidoptera of Northumberland and Durham," has this interesting observation:—"Our fellow member, Mr. William Backhouse, informed me that about the year 1820 he saw vast numbers of this species strewing the sea-shore at Seaton-Carew, both in a dead and living state. Now," continues Mr. Wailes, "it is surely more reasonable to suppose that these specimens had been blown from tha land than that they had crossed a sea at least three hundred miles; and a specimen in Mr. Backhouse's collection confirms this opinion, as it has the pale whitish margin to the upper side of the wings so characteristic of our British specimens, which is replaced by yellow in nearly all the continental and American specimens." Mr. Stephens adds, on the authority of the same excellent entomologist, "Mr. Backhouse informs me that it has been found repeatedly near Seaton, Durham, and often floating on the river Tees." These quotations prove, as I consider, incontestably that in former years this butterfly has been abundant some years both in the north and south of England.



15. Peacock (*Vanessa Io*).

15. Peacock.—The hind margins of all the wings are angled; the fore wings with the lower half of that deep red-brown colour which is called dragon's blood; the costal margin at the base is black, delicately barred with yallow; beneath this are two black blotches, and between them a yellowish spot; beyond the second and largest black blotch is a large and beautiful eye-like mark, composed of a variety of colours, and below this eye are two small blue-white spots: the hind margin is broadly bordered with smoky-brown: the hind wings are smoky-brown towards the costal and hind margins, red-brown towards the inner margin, and having a beautiful eye-like mark towards the apical angle. The underside is jet-black.

Life History.—The eggs are laid in April and May, on the common stinging-nettle (*Urtica dioica*), and the young caterpillars emerging in about ten or fifteen days, according to the temperature, feed, and to the best of my knowledge exclusively, on the leaves of that familiar but unpopular plant: they generally attain their full growth during the first week in July, but sometimes arrive at maturity a week earlier, and also not uncommonly a week or a fortnight later: when full-fed the caterpillar rests in any position it may have accidentally assumed while feeding or seeking food; it has rather a limp and flaccid habit, and falls to the ground helplessly on the nettle's being shaken, but almost immediately re-ascends and recommences feeding: it seems difficult to imagine how it can escape the sharp spines of the nettle, or what antidote it possesses against the injury, supposing it to receive one; certain it is that the creature traverses most fearlessly both the stem and leaves of the nettle, and appears to remain unscathed among the phalanx of poison-laden spears with which it is threatened on all sides: have the spines any protective function? The

head is wider and larger than the second segment, shining, but beset with nipple-shaped warts, each of which emits a bristle from the summit; the body is almost uniformly cylindrical but spiny, the incisions between the segments are marked with considerable distinctness, the sections of the segments being also defined by transverse lines, each section having a series of minute warts, and each wart emitting a slender hair from its summit: with the exception of these spines and warts the surface of the body is velvety: the anterior half of the dorsal surface of the second segment is shining, but scabrous, warty, and bristly, the posterior half is velvety; this segment is without spines, but its pectoral surface has an oblong median aperture exactly between the fore legs, and somewhat resembling an enlarged spiracle, the margins of which have been produced and elevated; the third and fourth segments have each two dorsal spines placed transversely, distant and rather spreading; the fifth has four spines, two dorsal and one on each side lateral; the remaining segments, the sixth to the twelfth, both inclusive, have each six spines, two of them dorsal and two on each side lateral; and the thirteenth has four spines arranged in a trapezoid, and all of them directed backwards; in those instances in which six spines are present—three on each side—the middle one of each three is placed a little in advance of the other two; it must be borne in mind that there is no medio-dorsal series: the fifty-two spines the situation of which I have attempted to describe are very similar to each other; all of them possess a polished and acutely-pointed shaft, and all emit a number of lateral bristles: the head and body are black, the spines also black, and the warts white, while the hairs emitted from the surface are gray; the legs are black and shining; the claspers are pitchy brown, with paler extremities; along the top of each clasper is a fringe of gray hairs curving downwards. The CHRYSALIS state is assumed during the first or second week in July, and the transformation takes place, in confinement, on the cover of the vessel, whatever it may be, in which the caterpillars have been fed. They spin little humps or hillocks of silk on the glass cover, and from this suspend themselves by the anal claspers; on the third day the back of the chrysalis may be seen projecting through a slit in the skin behind the head of the caterpillar, and the contrast in colour between the green and newly-formed chrysalis and jet-black skin of the caterpillar from which it is now disengaging itself is very striking. In a state of nature the chrysalis may sometimes be found suspended among the leaves of the nettle, but generally on other plants or objects at some distance from its food. The head of the chrysalis has two pointed ears, or rather cases, containing the future palpi; these are very distant, and their tips are rather curved outwards; the back has a thin keel, which rises to a point in the middle; the shoulders of the wing-cases are also pointed, and there are two series of sharp points on the dorsal surface of the body, each series consisting of six points, of which the anterior pair, those nearest the thorax, are considerably the smallest. The colour of the chrysalis is green, the cases of the head and wings being bright apple-green, and the body ochreous green; all the points are darker: as the chrysalis hardens, its colour deepens, but the green tint is never entirely lost. Dr. Lucas, Mr. Merrin, Mr. Biggs, and Mr. West, have most kindly and liberally supplied me with caterpillars expressly for this work.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is to be found on nettles in June and July; the chrysalis in July and August; and the butterfly in August, continuing on the wing more or less abundantly until it hybernates: specimens occurring in the spring have certainly hybernated.

LOCALITIES.—A butterfly of almost universal distribution: as regards Ireland, Mr. Birchall says "it is common in Leinster, Munster, and Connaught, but apparently rare in Ulster;" and as regards Scotland, Dr. Buchanan White observes, "it is by no means common in Perthshire, its sole claim as a native resting on a few specimens taken near the Bridge of Allan: it occurs as far north as

Forres, but except in the very south is a rare butterfly in Scotland." It is present in every English list I have received, and scarcely a correspondent has thought it worth his while to make any observation on its abundance or rarity. It has no predilection for particular situations, except as attracted by flowers, and in the country those of teasels and thistles, and in gardens those of Michaelmas daisies seem especial favourites.



16. Red Admiral (*Pyrameis Atalanta*). Upper side.



Under side.

16. Red Admiral.—The hind margin of the fore wings only is angled, and these very obtusely; all the wings are scalloped; the colour is intense velvety black; the fore wings have a transverse oblique scarlet band from the middle of the costal margin to the anal angle; the females have a small round white spot in this band; beyond this band and nearer the tip of the wing are six snowy-white spots of different size and shape; the hind wings have a scarlet band on the hind margin, and in this band are four black spots and one long blue spot at the anal angle. The under side presents such a beautiful combination and blendings of grays, pinks, and browns as Nature only can produce and words cannot describe. My artist and engraver have exerted themselves to the utmost to produce a faithful representation of this wonderful object, and have succeeded as well as human hands can succeed.

Life History.—The egg is solitary, laid in May and June, here and there, on the leaves of the stinging-nettle (*Urtica dioica*): almost immediately after emerging from the egg the little caterpillar draws together the leaves of the nettle, and feeds in concealment; as it increases in size it requires more space, and

continues to increase the size of its domicile up to the period of pupation; I have never met with it feeding exposed: when removed from its retreat it feigns death, bending its extremities together; all its movements are slow and lethargic, and its only object, when exposed, appears to be again to conceal itself. When full-fed the head is broader than the second segment, but narrower than the succeeding segments; it is covered with projecting warts, which vary considerably in size; the body is obese, tapering slightly towards the extremities; the second segment is narrow, having a transverse series of small spines, one of which on each side is somewhat larger and more horny than the rest; the third and fourth segments have each a transverse series of eight spines; one pair on each side is small and inconspicuous; the remaining four are longer, conspicuous and branched, or emitting minor spines, each of which terminates in a bristle; the other segments, from the fifth to the twelfth inclusive, have each seven branched spines, one medio-dorsal spine being placed in advance of the rest; the thirteenth segment has four spines. The head is black and rather shining, the smaller points being white, and the larger ones black: the ground colour of the body is generally gray-green, sprinkled with black, and having a rather broad waved stripe on each side just below the spiracles: the belly is smoky flesh-colour; the legs are shining black; and the claspers smoky flesh-colour: such is a description of the usual colouring, but this is extremely variable; the ground colour in some specimens is dingy white, and the lateral stripe scarcely distinguishable; in others it is mottled gray-green, the lateral stripe inclining to yellow: again, in others, the ground colour is intense black, thickly sprinkled with white dots, and the lateral stripe brilliantly white or yellow: again the spines on the third segment are sometimes intensely black, while all the others are smoky flesh-coloured, but in other specimens all the spines are alike dingy and semi-transparent, with black tips. When full-fed it constructs a somewhat more elaborate retreat; it gnaws through the petiole of a leaf, or eats the main stalk of the nettle within a few inches of the top, not quite separating it; the part thus almost separated falls over and completely withers, and this withered portion is formed into a compact retreat, secured from casualties of weather and from the inspection of birds; from the roof of this the caterpillar suspends itself by the anal claspers, and in two days becomes an obese, humped, and angulated CHRYSALIS, the head of which is notched on the crown, the divisions containing the palpi being distant and very obtuse; the thorax has a large dorsal elevation terminating in a median point: on each side near the edge of the wing-cases are two obtuse angles; on the back of the body are three longitudinal series of elevated points; the median series consists of six rather insignificant and inconspicuous points; each lateral series consists of nine points, two of which are thoracic and seven abdominal, the lateral points being much larger and more conspicuous than those of the median series; the anal segment is slender and beak-like, and is terminated by a dense fringe of minute and very acute hooks, by which the chrysalis is suspended from the silk of which the roof of its retreat is constructed: the colour of the chrysalis is reddish gray, delicately reticulated and marbled with black: it appears covered with bloom, like that on a ripe plum, and is adorned with very beautiful golden spots, more especially on the lateral thoracic points.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is found on nettles in June, July, and August: the chrysalis in July and August; the butterfly in August, September, and October. It seems to delight in settling on autumnal flowers and sunning itself on leaves, or in pathways; but the ovary of the female contains no eggs, and she seems to possess no attraction for the male; both sexes hybernate early; they reappear in the spring, but later than our other Vanessidæ: the usual intercourse then takes place, and oviposition follows.

Obs.—This species occasionally departs so far from the ordinary habits of butterflies as to have been detected wandering about by

night. I have repeatedly taken it in October at the sugar prepared for Noctuæ in the garden at Leominster, and Dr. Jordan has recorded, in the 42nd number of the "Entomologist's Monthly Magazine," an instance of its coming to light.

Localities.—It occurs everywhere in England more or less commonly. Mr. Birchall says it is common everywhere in Ireland. It occurs in every list I have received from Scotland, generally without comment on its abundance or rarity. Dr. Buchanan White says it is sometimes not uncommon in Perthshire, but it is variable in the periods of its appearance, one year being abundant and another year very rare.



17. Painted Lady (*Pyrameis Cardui*).



Var. 1.

17. Painted Lady.—The hind margin of the fore wings is scarcely if at all angled, but, as well as those of the hind wings, decidedly scalloped; the fore wings are variegated with black and pale red; the tip is black, with five snowy-white spots of various size and shape; the middle of the wing is red with black blotches; and the base of the wing is beautifully powdered with scales of an orange colour, which glitter like mother-of-pearl; the hind wings are much the same colour as the fore wings, but without the white spots at the tip, and having three rows of black spots parallel with the hind margin; the spots in the inner row are round; in the middle row long and narrow, and in the marginal row rather lozenge-shaped; the under side is very beautifully varied, but does not equal that of its congener the Red Admiral.

Var. 1. In this variety all the usual markings are absent or completely altered in form. The specimen figured is in Mr. Ingall's collection.

Life History.—The egg is laid singly on the field thistle (*Carduus arvensis*), generally towards the end of June, and generally also

low down on the plant, and the young CATERPILLAR emerges therefrom in eight or nine days: it soon draws together the points of the thistle-leaves with a very slight web, more like that of a spider than the usual webs concealing *Lepidoptera*, and thus, very imperfectly concealed, it feeds with great voracity, and grows so rapidly as frequently to be full fed in fourteen days, when it rests in a straight position, but falls from its food-plant, forming a compact ring, if annoyed. As the caterpillar increases in size it ascends towards the flower-head, leaving its prior domicile, so that half a dozen of these dwellings may sometimes be found on one plant, but two caterpillars rarely, if ever: the needles or spines of the thistle-leaves always rejected as food, are suspended in the web; the excrement of the caterpillar is also found abundantly in the web, showing that, in a sanitary point of view, the Painted Lady stands rather low. The head is fully as wide as the second segment, and scabrous; the crown is bilobed, each lobe emitting several warts and numerous bristles. The body has the segmental divisions clearly marked, and a lateral skinfold not very strongly pronounced; the second segment has numerous short dorsal spines, each of which emits a terminal bristle; both the third and fourth segments have two longer lateral spines emitting lateral branches; the remaining segments from the fifth to the twelfth, both inclusive, have seven branched spines, one of them mediodorsal and slightly in advance of the rest, the third on each side is on the skinfold: below the skinfold and above each clasper is a conspicuous sesquialterous wart, emitting curved bristles: the thirteenth segment has four spines placed in a quadrangle, the posterior pair larger and more conspicuous than the anterior pair: all parts of the body emit scattered hairs. The colour of the head is dull black; the dorsal surface of the body is black, the spines paler, with black tips and branches; the hairs are white; the skinfold separating the dorsal and ventral surface is yellow; the ventral surface, legs, and claspers are pitchy red; the spiracles above the skinfold are pale in the middle; then surrounded with black, then again with paler. In many individuals the dorsal surface is irrorated with yellowish white dots, which are more conspicuously collected in a double series along the back, interrupted by a narrow mediodorsal stripe intensely black; in these examples the bulbous base of each spine is pitchy red. When full fed the caterpillar spins a small but dense patch of silk on the surface of any object within reach, and, suspending itself therefrom by means of its anal claspers, changes to a CHRYSALIS, which has the head broadly truncate, but not eared; the back of the thorax is produced into a median point, and has a point on each side in advance of the median point, and two more prominent points on each side on the margin of the wing-cases; the body has three series of obtuse points, the mediodorsal series consisting of six points, the lateral series of eight points, the anal extremity produced into a slightly curved beak-like process, which is terminated with a fringe of minute hooks, by which it is suspended. The colour is ochreous-gray, striped with dingy-brown, and adorned with gold reflections; the dorsal points are golden metallic yellow; there is a spear-shaped black mark between the tips of the wing-cases, apparently covering the extremity of the maxillæ; the cases of the antennæ have a double series of black dots; the anal beak has on each side a conspicuous black stripe, and various parts of the wing-cases and abdomen have distinct black dots.—*Newman.*

TIME OF APPEARANCE.—The caterpillar is to be found in June, the chrysalis in July, and the butterfly in August—but the sexes appear to take little notice of each other, and may be seen frequenting gardens, or settling in roads, or on the blossoms of thistles and teazles by the road-side, until the end of October, when they retire to their winter-quarters again to appear in April, May, and June: copulation then takes place, and oviposition follows during eight or ten succeeding days.

Obs.—There is something very exceptional in the conduct of this species; something that renders it impossible to lay down with precision any rules for the appearance of either caterpillar or chrysalis; with regard to the

butterfly, appear when it will, it never seems to be out of season. Although the preceding paragraph is offered as a summary of very numerous observations, still it can scarcely be considered as sufficient or satisfactory, since the insect itself seems to consider no laws binding, and the simple question whether, as a rule, one, two, or three generations are disclosed during the year still remains without solution. The "Entomologist," which has done so much to cherish the science of entomology, and to extend the researches and investigations of the true lover of Nature beyond the drawers of a cabinet or the technicalities of the pedant, has, during its useful career, given us abundant evidence of this. Thus we find, at p. 305 of the second volume, even that excellent observer, Mr. Pristo, confessing himself at fault on this important point of its life-history :—"I am in a fix at present about the economy of this species : there are small and nearly full-grown caterpillars feeding together now ; in fact, only yesterday, September 19, one spun up, and another—a very small one—changed its skin. Whether these late caterpillars are produced by the early butterflies of this year or the late ones of last year I am unable to determine. I believe all will produce the perfect insect this autumn." Mr. West, another of our very best observers, has, at p. 363 of the third volume, a very similar record :—"The caterpillars of *Pyrameis Cardui* have appeared in this neighbourhood for the second time this season. I have enclosed a few in a box, thinking you may be interested in the appearance of a second brood. Between the 26th of July and the 16th of September I could not find a single caterpillar. On the 16th of September I took four dozen very small caterpillars, and on the 24th about three dozen some of them full fed." During the same year I received, through the kindness of Mr. Pristo, early caterpillars, and these accomplished their metamorphosis early in the autumn, but no appproach towards a second brood was made by the butterflies.

Localities.—Truly cosmopolitan, but intermittent and irregular. I have sometimes passed years without seeing a specimen ; at other times it may be said to swarm on the blossoms of clover (*Trifolium*), sainfoin (*Hedysarum Onobrychis*), and lucerne. Mr. Birchall says it is common everywhere in Ireland, and is often found on the summits of mountains ; and Dr. Buchanan White informs us that in Scotland it occurs from the sea-level up to the base of Ben Lawers. In Wales I have observed it at the Menai Straits, and up to the stone cairn on Snowdon. In England I know of no locality where it does not occasionally appear, but mostly in small numbers. A few exceptions occur, and I will cite one of them.

Mr. F. Smith, ot the British Museum, the illustrious historian of British Bees and British Fossorial Hymenoptera, has published, in the 19th number of the "Entomologist's Monthly Magazine," the following vivid picture of an entomological treat he enjoyed at Ilfracombe in October, 1865 :—At the western extremity of Ilfracombe stands a parish church, passing behind which you enter a narrow lane—"a Devonshire lane" ; its beauty will be appreciated by every one who has visited Devon, and he will thoroughly understand the meaning of the above apellation—he will know how it winds, and turns, and winds again—just so does the lane at the back of the church, until you arrive at a gate at its extremity that opens to the breezy downs. The last fifty yards of the hedge, on the right hand of the lane, is covered by a mantle of ivy, which, on the 9th of October, was in full blossom, but the flowers were almost hidden from sight by a countless multitude of butterflies and moths : it was one of the most beautiful sights I ever beheld. The multitudinous host only comprised two species of butterfly, *Pyrameis Atalanta* and *P. Cardui* —scores of the former, but hundreds of the latter. The majority of them appeared to be so overpowered by imbibing the nectar of the ivy-blossoms, that I had no difficulty in taking specimens of Cardui between my fingers.

Many unsuccessful attempts have been made to discover some law by which to account for the irregular appearance of this insect.

Family 4.—White Admirals (in science *Neptidæ*).

The heads of the carerpillars are exserted and shield-like ; the face is generally flattened and beset round the margin with strong spines, particularly observable on the crown ; the body is of nearly uniform size and beset with branched and often clubbed spines ; they feed on a variety of plants. The chrysalids are always angled, and sometimes humped in a very extraordinary manner. The head is always eared. The perfect insect has but four legs, the anterior pairs having no claws, and being unfitted for walking. The wings are not angled, but scalloped. We have but one genus inhabiting this country—*Limenitis ;* but in the East the genera and species are most abundant.



18. White Admiral (*Limenitis Sibylla*). Upper side.



Under side.

18. The White Admiral.—The wings are scalloped but not angled, their colour is rusty black ; the fore wing has about a dozen white spots, very various in size and shape ; the hind wings have an oblique transverse median white band. The markings on the under side are exceedingly beautiful and complicated, almost vying with those on the under side of the Red Admiral.



Variety of White Admiral. Upper and Under sides.

Varieties.—An extraordinary variety of this species occasionally occurs in which not a trace of the usual markings is to be found on the upper side, a uniform sooty black being diffused over the whole surface. The under side is equally abnormal. The beautiful specimens figured are in the rich cabinet of Mr. Bond, and are kindly lent expressly for this work.

Life History.—In July the pregnant female is seen hovering over the thickest parts of our taller copses, wherever the stems of the honeysuckle are imbedded, like petrified snakes, in the upright stems of the hazels, and the foliage of that sweet climber has surmounted the hazel spray, and its blossoms are gaping wide in the sunshine, and diffusing their delicate fragrance on the summer air. The actions and movements of a female butterfly when engaged in the maternal duty of oviposition are very different from her ordinary gait when sailing over the opening blossoms of the bramble in company with friends, lovers, and kinsfolk. It is evident to the eye of the naturalist that she is now on weighty affairs of business ; there is no time lost, none of

those flirtations and love chases so much admired and so glowingly described by our predecessors in the study of entomology. Her flight is slow, flagging, flapping, and only from leaf to leaf. She selects with unerring discrimination the leaves of the honeysuckle, even when surrounded, and apparently half smothered, with the foliage of the hazel, and lays a single EGG on the upper surface of a leaf; she then flutters off to another, then to another, never tiring, never hesitating which leaf to choose, but always directed by an unfailing instinct to the honeysuckle, and always avoiding those leaves on which an EGG has already been deposited. The egg is something the shape of an orange, only flatter at the poles, and has been compared to those sea-urchins or sea-hedgehogs which are found on the sea-beach, and are to be seen in the window of every shell-shop. In fourteen days the little CATERPILLAR comes out of the egg-shell, and toddles to the very tip of the leaf before it begins eating, and then it nibbles away day after day, eating the green part, and leaving only the midrib sticking out like a bristle, and always after a good meal of leaf it goes to the very point of this bristle, and there rests while its meal digests and while it acquires strength for future attacks on the same leaf. Day after day the alternate processes of eating the leaf and resting on the tip of the bristle-like midrib continue, until three-quarters or rather more of the leaf has been eaten, and then it knows that its devouring duties for the year are over. We all know that the leaves of the honeysuckle are deciduous, and, in the course of Nature, would fall off before winter; this, however, would not suit the requirings of the juvenile caterpillar, which, having once fallen to the ground with the fallen leaf, would inevitably perish. To prevent this falling is absolutely necessary to the existence of the caterpillar, and therefore to the preservation of the species; how then is this to be accomplished? The caterpillar, by spinning a number of silken threads wound round and round the twig, and round and round the leaf-stalk, fastens the leaf-stalk to the twig to which it is still attached. The next process is to make a winter habitation of that portion of leaf that still remains uneaten; the corners of this uneaten portion are fastened tightly together, and then the edges are united, these operations being effected by means of silk spun from the mouth; the work is then finished, and the little caterpillar is thus laid up for winter quarters inside his hammock, the bristle-like midrib of the leaf curling over it like a tail. Now the process of fastening the leaf to the twig by silken cables has done nothing to prevent the natural dehiscence of the leaf-stalk at its base, so that this inevitable process takes place at the appointed time, and then the little cot, instead of standing erect, falls as far as the cables will permit, always less than half an inch, and rocks to and fro all the winter, lulling the infant caterpillar to sleep, and keeping him asleep for six consecutive months; rain, snow, ice, wind, and all the vicissitudes of our winter, have no power to injure or even to awaken him; hung aloft in his little cradle he rocks in comfort and security, and rides out the roughest storm without a thought of harm. In April he wakes up. The same increase of temperature which poets tell us rouses "the torpid sap detruded to the roots"—a very apocryphal doctrine, by the way, as the change of temperature is more likely to be felt in the air than in the earth: however, the same change of temperature which compels the leaf-buds to burst also resuscitates the little caterpillar; he wakes up, crawls out of his hammock, and commences operations on the expanding leaves. He now no longer confines himself to the tip of the leaf, but feeds away, with all the voracity which a winter's fast may be supposed to have engendered, during nearly the whole of April and May; and by the 1st of June is full fed.

The head is about the same width as the second segment, but decidedly narrower than those which follow; it is held in a prone position, looking downwards; the crown is slightly notched, and from each division arises a spine almost erect but slightly bent backwards; the face is flattish and rough, with small warts and short simple spines: the body is almost

uniformly cylindrical, but the segments are slightly swollen, and the incisions between them marked with decision; the dorsal surface is shagreened, the lateral surface more strongly so, the inequalities almost amounting to spines on the slightly dilated skinfold; there are also circles of similar small spines round each of the claspers, and a transverse series on the ventral surface of each segment, but the most striking armature of the caterpillar is on the back; the third, fourth, sixth, eleventh, and twelfth segments have each two conspicuous erect spines placed side by side; the fifth, seventh, eighth, ninth, and tenth segments have each two shorter spines, and the thirteenth segment has four still shorter and smaller: all these spines are branched or rather bristle-bearing. The colour of the head is pinkish brown, with a darker longitudinal line down each side of the face: the body is dark green on the back, paler on the sides, and the little warts causing the appearance of shagreen are yellow; under a lens they have the appearance of yellow grains of sand; the spiracles are white, and there is a narrow but very decided white side-stripe below the spiracles; on each side of each segment is a yellowish blotch; the spines are pink at the tip, reddish brown below, and paler at the base; their bristles are black; the ventral surface is apple-green approaching to glaucous at the incisions of the segments: the legs are obscure brownish green; the claspers are rather paler and their disks pink. When full fed it spins a silken web over the under surface of a leaf of the honeysuckle thickened into the form of a pad on the midrib; and attaching itself to this by the anal claspers, it suspends itself in a curved position waiting for the change to a CHRYSALIS. Mr. Buckler graphically describes the change as follows, in the 38th number of the "Entomologist's Monthly Magazine":—"In the course of the third day the creature seems to wake up, unbends its head, swings itself to and fro a few times, then stretches itself downwards in a long attenuated line, which causes a rupture of the skin close to the head, which is seen slowly to ascend, exposing the bare and soft shining parts below, from which a flat and forked pair of horns grow out perceptibly as one beholds this wonderful process; the skin continues to glide slowly upwards; and as the soft parts become exposed they are seen to swell out laterally, and assume the very singular projections of the chrysalis; the skin of the old head gliding up the belly marks the progress of the disclosure, as the colours of the old and new surfaces are at this time alike, but the new rather more shining and semi-transparent; occasionally, during the bulging out of the soft parts, a kind of convulsive heave or two occurs, but otherwise it remains still until the creature is uncovered as far as the ninth or tenth segment; it then curves its anal extremity by a sudden twist laterally, and in a moment dexterously withdraws the tip of the anal segment from the claspers by an opening on the back of the skin at that part; at this critical moment one has time to see that the naked, shining point is furnished with black hooks, and to expect its fall, but in another moment it has forcibly pressed the curved tip with its hooks against the stem, close to its previous attachment of the anal claspers, which has proved strong enough for the occasion. The creature now seems endowed with wonderful power and vigour; it swings boldly to and fro, and undulates itself as if to gain longer swings, when presently the old skin that remains is seen to burst away and fall off, the chrysalis gradually becoming quiescent; the entire metamorphosis, from the first waking to the last movement, occupying nearly seven minutes. The chrysalis is very angular, and its wing-cases very projecting; the dorsal surface of the thorax rises to a prominent ridge, and a little beyond it is a flat, round, and very projecting process; on the bank and from thence to the anal tip, the abdomen is slightly sinuous, and therefore hangs a little on one side; two flat forked processes project from the head. Its colour at first is a greenish white, but it gradually darkens, and in a few days the thorax and wing-cases are deep olive-green, the centre of the back of the abdomen bright apple-green, its tip and underside being dark brown, which

forms on the back a broad band, including the flat circular prominence at its termination. The hare's-ear-like projections at the head are also dark brown; the wing-rays can be seen distinctly, the portions that at first appeared quite white have now been transmuted into metallic adornments, a brilliant golden streak divides the brown colour from the green of the wings, commencing on each side the back of the thorax, and a spot on each side the tip of the tail; three silvery spots decorate the under side of the body, and the head and its prominences are embellished, both above and beneath, with similar spots and streaks."

Obs.—I must here observe that we are indebted to Mr. Hunter for the first description of the caterpillar and chrysalis of the White Admiral from English specimens: it was published at page 3185 of the "Zoologist" for 1851. The descriptions by Curtis and other British authors, copied from Hubner, refer to other species (*Limenitis Camilla*) not yet found in Britain: the error originated in the fact that Haworth applied the name *Camilla* by mistake to our English insect. A second and much more detailed description of this caterpillar, by Mr. H. L. de la Chaumette, is published at page 3237 of the same volume, and a description of the caterpillar of Camilla is given to show the difference between the two species; but both descriptions are from Swiss specimens; mine are from English specimens.

Time of Appearance.—The caterpillar is to be found hybernating in the winter, and full fed at the end of May and beginning of June, the chrysalis at the end of June, and the butterfly in July. It is fond of settling on brambles, but distinguishes itself by a most graceful flight up and down the roads in woods.

Obs.—"The graceful elegance displayed by this charming species when sailing on the wing is greater perhaps than can be found in any other we have in Britain. There was an old Aurelian of London so highly delighted at the inimitable flight of Camilla [Sibylla], that long after he was unable to pursue her, he used to go to the woods, and sit down on a stile, for the sole purpose of feasting his eyes with her fascinating evolutions."—*Haworth.*

Localities.—This butterfly is absent from the Irish, Manx, and Scotch lists, and from most of the English ones. The following localities have been received:—

Buckinghamshire. Black Park: a very favourite locality fifteen years ago, but now closed against entomologists—*S. Stevens and many others.*

Dorsetshire. Parley Heath and Bere Wood—*Rev. O. Pickard-Cambridge.* Mr. Dale gives this information with a query.

Essex. Parkall Woods, near Epping, sparingly; near Colchester in profusion—*Edward Doubleday;* St. Osyth—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. A single specimen at Clifton, near Bristol.

Hampshire. One near Winchester, 22nd June—*J. S. Wesley;* near Andover, 23rd June—*J. T. Moore;* Woods near Horndean, abundant—*H. H. Crewe;* near Lyndhurst and Brockenhurst—*F. Bond;* occasionally taken in the New Forest, but never common—*G. B. Corbyn;* in oak woods near Portsdown—*Henry Moncreaff;* Emsworth—*W. H. Draper;* Woolmer Forest—*C. G. Barrett.*

Kent. Tenterden—*Stainton's "Manual."*

Lincolnshire. Common in the south of the county in fine seasons—*T. H. Allis.*

Northamptonshire. The Lynches, near Wodenham—*F. Bond.*

Suffolk. Bentley, Coomb, &c.—*H. H. Crewe.*

Surrey. Haslemere—*C. G. Barrett.*

Sussex. Near Steyning—*J. H. White;* at Iden, near Rye, the only place I have ever seen it—*E. Jenner;* Ashling—*W. H. Draper.*

Wight, Isle of. Generally distributed in our woods—*James Pristo;* Parkhurst, Apse Wood, and Whitefield Wood—*Alfred Owen;* Ryde—*W. H. Draper;* Brading, 24th July—*J. D. Pinnock.*

Worcestershire. Worcester—*Stainton's "Manual."* My entomological correspondent at Worcester, who has taken the utmost pains to supply me with information, does not confirm this report.

Natural Order II.—Slug-shaped Caterpillars (in science *Limaciformes*).

The distinguishing character, and that to which we have no exception among the British species of the Order, is the slug-like form of the caterpillar: it is generally covered with minute warts, giving the surface the appearance of very fine shagreen; it is without spines, and the body terminates in two points, which are directed backwards. The chrysalis is angled, but not sharply so; its head is broad, often as though cut off abruptly: in some species it is rounded or very blunt; in others it has two rather distant short points, generally described as ears; it is always or almost always, suspended by the tail, and hangs head downwards. The perfect insect has the fore feet totally unfitted for walking, and without claws. The British species are divided into two families.

Family 5.—Emperors (in science *Apaturidæ*).

The caterpillar is very stout in the middle, but more slender towards the head, the crown of which is produced into two horns (which are usually directed forwards when the creature is crawling), and very much, although gradually, tapered towards the tail. The chrysalis is always suspended by the tail; it is stout but rather compressed on the sides; its head is divided into two blunt points or ears. The perfect insect has only four perfect legs, and has very gradually thickened antennæ, ample wings, and a most powerful flight. We have but one British genus or species, commonly known as the Emperor (in science *Apatura Iris*).

Obs.—The word *Apatura* is probably misprinted for *Apodura*, signifying that the caterpillar has no feet at the tail or caudal extremity—a very striking character, but not confined to this particular genus, as will be seen in my descriptions of the Satyrs: the spelling cannot now be altered, having been so generally adopted.



19. Purple Emperor (*Apatura Iris*). Upper side of Male.

19. Purple Emperor.—The antennæ are rather long, and the club very gradually thickened: the fore wings are slightly arched on the costal margin, rounded at the tip, and without angles on the hind margin: the hind margin of the hind wings is scalloped, and the anal angle produced: the ground colour is rusty-black, the male being decorated with a purple lustre, which, in certain positions, is very beautiful; the female is without the purple gloss; on the fore wings are seven white spots, the position of which will be seen in the figure; it has also a portion of a transverse white band, which commences near the middle of the wing, proceeds to the inner margin, and is continued obliquely across the middle of the hind wings; in the male these markings are pure white, in the female they are tinged with yellow: there is a faint and undefined bar parallel to the hind margin of all the wings; the anal angle is tinged with rust-colour; and near the anal angle is an ocellated black spot, with a blue pupil and a rust-coloured circumscription. The under

side is very different from the upper, as will be seen from the very perfect representation given below: the general tint is dull rust-colour, shaded to gray along the hind margin of all the wings: on the costal margin of the fore wings are two white blotches, one near the middle, the other smaller, and halfway between the middle and the tip: between the larger white costal blotch and the base is a vague whitish space, containing two transverse black markings; towards the anal angle is an eye-like spot, black with a blue pupil and a broad rust-coloured circumscription, which is interrupted



Under side of Female.

by two white spots; between this eye-like spot and the base is a short transverse white bar, extending from near the middle of the wing to the hind margin: the hind wings have an oblique wedge-shaped median white band, the base of the wedge resting on the costal margin; there is a small blue-pupilled spot below this band, and equidistant between the hind and inner margins.

Varieties.—This insect is liable to variation,



Upper side of a variety in the cabinet of Mr. Bond.

which shows itself particularly in the absence or partial absence of the white spots and band.

At page 5923 of the "Zoologist" for 1858, the Rev. William Bree describes such a variety in these words:—"On the 13th of July, 1857, I had the good fortune to capture, in Ashton Wood, near Oundle, Northamptonshire, a very singular and interesting variety of *Apatura Iris*. There is an entire absence of the beau-

tiful white band which in ordinary specimens, crossing the middle of the hind wing, extends into the middle of the fore wing: of the five white spots extending in a curve from the costa to the anal angle, one spot only, namely the fourth, is visible; the two spots near the tip are smaller than usual, the second of the two being little more than a speck; the costal margin and the tip are strongly powdered with fulvous, and the usual fulvous ring of the hind wing being broken on its lower side extends in a strong fulvous marking over the anal angle: the rich purple shade is spread over the wings as in the ordinary specimens, blended, however, in parts with fulvous. The under side is equally remarkable, though difficult to describe; the colouring and markings are much confused."

A very beautiful example of this variety is figured on the opposite page. It is in the cabinet of Mr. Bond, and has been most kindly lent purposely to illustrate this work.

Life History.—Dr. Maclean, to whom I am indebted for the early history of this butterfly, watched a female deposit two eggs on the upper side of two leaves of the sallow, or great goat-willow (*Salix caprea*), on the 16th of July: the egg somewhat resembles a fossil *Echinus* which has lost its spines. One of these eggs the doctor took home, and it hatched on the 25th of July, just nine days after it was laid: the egg left on the leaf where its parent had deposited it, hatched on the 28th of the same month, having been in the egg state twelve days. The little caterpillars are of a dark brown colour: on the eighth day after being hatched they change their skin, and then are furnished with two horns or processes, attached to and forming part of the head; and it is curious that now, on the first appearance of these horns, they are proportionally larger and longer than at any other period of the creature's caterpillar life, and are evidently, although not deeply, cleft at the tip. With the first change of skin the caterpillar loses every tinge of its original brown colour, and becomes exactly of the same hue as the sallow-leaf on which it feeds: a portion of the leaf is consumed every day, but the midrib is left intact; and the little creature, when resting from its alimentary labours, climbs to the denuded bristle-like tip of this midrib, and there remains perfectly motionless, with the anterior extremity raised as we see it in the caterpillars of the privet hawk-moth and the puss moth. Dr. Maclean's caterpillar continued this mode of life until the 15th of November, when it descended from the leaf, and, covering with silk the rind of the twig immediately below the attachment of the leaf, grasped this web firmly with its claspers, stretched itself out at full length, with its horns porrected before it, and thus settled itself down to endure the winter's cold and the winter's storms. This is always the case; its *modus operandi* is the same whether in a state of nature or in the vivarium of an entomologist. Instinct, that infallible and inscrutable guide, tells the unreasoning caterpillar that dehiscence of the leaf-stalk will take place after the first frost, and that the leaf will fall to the ground: the leaf does fall, but not until its falling is a matter of indifference to the caterpillar; not until the caterpillar has attached itself so firmly to the twig that neither wind nor rain can remove it. In the ensuing spring, the same influences which compel the sallow to throw out new twigs and new leaves also resuscitate the torpid or dormant caterpillar; its eating propensities are aroused, and it feeds greedily until the period of its first metamorphosis has arrived.

The full-fed caterpillar rests on the sallow leaf in a nearly straight position, holding on by its claspers to a little silken coating which it spins on the under side of the leaf; but when feeding it bends its somewhat obese body with the facility, and I would almost say *elegance*, of a slug, but I fear many of my readers will scarcely appreciate the comparison. When annoyed, it contracts and incrassates its body, assuming a very lumpy appearance: the head is so exactly the same width as the second segment that it appears continuous therewith; the face is rather flattened, and the crown slightly notched, and produced into two slug-like horns, which are

of nearly equal size throughout, but are very slightly incrassated towards the tip; they are rough, with raised points, more particularly on the under side; these strange appendages move *with* the head, but possess no capacity for motion independently of the head; when the mouth is stretched out, as in feeding, the horns point backwards, but when the mouth is brought up to the chest their position is exactly reversed, and they point forwards; the width of the face is nearly the same at the mouth as at the forehead: the body is slug-shaped, tapering to both extremities, more particularly to the caudal extremity, which terminates in two short, parallel, closely approximate points, directed backwards; the surface of the body is rough, like shagreen, a character due to transverse series of warts, one of which series is on each section of a segment, and a fifth on a rather conspicuous skinfold which intervenes between the segments.

The colour requires a rather minute description; the horns may be called glaucous green, inclining to blue in front, to white behind, and to black at the tips; the space between them is of a pale yellow colour, approaching to white, but there is a pointed triangular green plate above the mouth, which enters into and almost divides the yellow part: I have said that each horn may be called white behind, thus presenting a white stripe from near the tip to the base; this white stripe is continued on the second, third, fourth, and partly on the fifth segment, where it fades into the general green colour of the back; on each side of the body is a very narrow yellow stripe traversing the region of the spiracles, extending the entire length of the caterpillar, and terminating in the anal point; there are, moreover, seven oblique lines on each side, all of them commencing near the lateral stripe which I have just described, and running upwards and backwards, but not meeting on the back; the third of these oblique lines is the longest, reaching nearly, but not quite, to the middle of the back; this line is also rather stouter than the others; they are all of a yellow-white tint, the third being rather conspicuously bordered at the upper anterior extremity with purple; the ventral surface is glaucous green, and the legs and claspers are nearly concolorous. When full fed the caterpillar fastens itself by the anal claspers to a silken carpet it has previously spun on the under side of a sallow-leaf, and, thus suspended, changes to a CHRYSALIS, which is obese, dumpy, awkward-looking, somewhat compressed laterally, and somewhat keeled dorsally; the head terminates in two approximate short points or ears: the colour is apple-green, the wing-cases being rather darker, and the body rather yellower, and the seven oblique lateral stripes which I described in the caterpillar are still to be observed on the sides of the chrysalis.

TIME OF APPEARANCE.—The full-fed caterpillar in May and June, the chrysalis in June, and the butterfly in July.

Obs.—The Purple Emperor has achieved a great reputation among English entomologists for his lofty flight, and the extreme difficulty of securing him with the hand-net. Haworth says, "The Emperor invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which on sunny days he performs his aerial excursions, and in these he ascends to a much greater elevation than any other insect: I have even seen him sometimes mounting higher than the eye can follow; especially if he happens to quarrel with another Emperor, the monarch of some neighbouring oak: they never meet without a battle, flying upwards all the while, and combating with each other as much as possible: after which they will frequently return again to the identical sprigs from which they ascended. The wings of this fine species are of a stronger texture than those of any other in Great Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists. The Purple Emperor commences his aerial movements from ten to twelve o'clock in the morning, but does not perform his loftiest flights till noon, decreasing them after this hour until he quite ceases to fly about four in the afternoon: thus emulating the motions of that source of all his

strength, the sun." Let us next consider another phase of imperial life presented to us by Mr. Hewitson, at page 315 of the first volume of the "Entomo'ogist" :—"At the end of a long and very rapid flight at the outskirts of the wood they (the Emperors) would enter its more shaded recesses, and settling wherever moisture was to be met with, would protrude into it their thin long trunks, and were soon heedless of my approach. I found a flat, bagless net by far the best when their wings were thus expanded, allowing them no room for motion. Instead of employing their sunny hours in sipping sweets, and

'Gathering honey all the day
From every opening flower,'

their delight was to extract the juices of each swamp-hole, and the filthier the puddle the more it seemed adapted to their taste. Herds of swine are brought to pasture on the borders of the forest, and it was their droppings that seemed to supply the Purple Emperors with their choicest feast. Seating myself near one of these, I selected the finest specimens as they settled down, and watched them till they closed their wings ; and so intent were they on their occupation that they would usually permit me to take them between my finger and thumb. They were so numerous that I have had no less than seven under a small net at one time, and even then they showed but little anxiety to get away." Again, Mr. Sturgess writes thus, at page 59 of the second volume of the "Intelligencer" : — "You may judge how agreeably surprised I was to learn, one scorching day in July, that the Purple Emperor had been caught regaling himself upon the imperial delicacies of dead stoats, weasels, &c., hanging upon some low bushes as a terror to evil-doers. I need not say that I did not neglect the first opportunity of visiting the spot, and had the satisfaction of seeing within the space of an hour three Emperors descend from their thrones to breakfast upon the delicious viands." And again, Mr. Russell, writing from Ashford, in Kent, informs us, at page 139 of the same volume, "that on the 18th he captured two males of this insect in fine condition, one of them from the head of a dead cat nailed to a lodge in the wood." A few pages further on in the same instructive journal (page 155) Mr. Sturgess again reports progress thus :—"Some of your readers may be glad to learn the result of the captures indicated above ; I believe the following is a correct list :—On the 11th of July three specimens ; on the 13th, six ; on the 14th, seventeen ; on the 15th, twenty ; on the 16th, eight ; on the 17th, six ; on the 18th, fourteen ; on the 23rd, three ; and on the 24th, three ; making a total of eighty specimens in nine days. The experiment was not tried in the same place as last year, but in a wood of some thirteen hundred acres, where the Emperor appeared to be more plentiful : the keeper kindly consented to nail a portion of rabbit-skin and the wing of a bird to the end of a house ; a similar bait was also placed on a lime-heap about a dozen yards distant." Here is sufficient evidence of the kind of delicacies best adapted to the imperial palate : an adaptation which, however I may regret, I am unable to dispute. I would gladly have depicted the Emperor of our insect world as banqueting on ambrosia, an esculent of which, by the way, I have no clearly defined idea, or quaffing the nectar of flowers, but this would not be truthful : in this and other cases of depraved appetite, we can only lament a fact as incontrovertible as it is unsatisfactory, repeating the somewhat trite, but ever sapient axiom, *de gustibus non est disputandum.* I am able, however, to assign his imperial majesty one instance of more refined taste—Dr. Knaggs records, at page 165 of the fourth volume of the "Entomologist's Weekly Intelligencer," that he succeeded in decoying an Emperor by painting the trunk of a tree with sugar, and thus secured him.

Localities.—This beautiful insect is unknown in Ireland, Scotland, and the Isle of Man, and its range in England is restricted to the oak woods of the midland, eastern, and southern counties. I give a list of the localities it is known to visit :—

Bedfordshire. Clapham Park Woods—*Stainton's "Manual."*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. At Claydon I observed several specimens flying about the tops of the oaks in the woods here last month (August), but although I procured a pole about twenty feet long for my net I was unable to take any —*H. H. Crewe.*

Cambridgeshire. Woods near Cambridge—*Thomas Brown.*

Devonshire. Occurs occasionally near Barnstaple, North Devon—*G. F. Mathew.*

Dorsetshire. Woodland Wood, near Hanford, the seat of the late H. Seymer, F.L.S., and near Cranborne—*J. C. Dale.*

Essex. Very rare at Epping, but common at Colchester—*Edward Doubleday*, in 1833; formerly common in the High Woods, Colchester, but I have not seen a specimen since 1860, and it has disappeared from all the other woods where it formerly occurred in the vicinity of Colchester. The last specimen taken here was flying round a moderator lamp in the evening, in the town itself. It still occurs at Coggeshall, and in Storr Wood, near Ramsay—*W. H. Harwood;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. Forest of Dean — *W. Langley.*

Hampshire. Near Lyndhurst and Brockenhurst—*F. Bond;* occasionally in the New Forest, but uncommon — *J. B. Corbyn;* Burton, near Christchurch — *J. C. Dale;* Southwick — *Henry Moncreaff;* Emsworth —*W. H. Draper;* Ringwood — *W. G. Wilkinson.*

Huntingdonshire. Monkswood and Brampton Wood, not uncommon, but very difficult to capture—*J. H. White;* Woods near Peterborough—*F. Bond.*

Kent. Tenterden—*S. C. Tress Beale;* Darenth Wood—*William Machin;* Perry Wood, Selling—*H. A. Stowell;* it is stated to occur in the woods round Pluckley, but I cannot report this from personal knowledge—*W. O. Hammond;* Knowle Park, near Sevenoaks—*Stainton's "Manual";* in the town of Ashford, settling on the front of a house—*A. Russell.*

Leicestershire. Leicester — *Stainton's "Manual."*

Lincolnshire. About Lincoln, Bardney Wood, and in South Lincolnshire—*T. H. Allis.*

Middlesex. Caen Wood, near Hampstead —*J. F. Stephens.*

Monmouthshire. In the Forest of Dean —*W. Langley.*

Northamptonshire. "Early in the morning, and on damp, gloomy days, I have several times seen to the greatest advantage as I conceive, the most splendid of all our butterflies (*Apatura Iris*) at Barnwell and Aston Wolds, sailing along the ridings, and settling upon the ruts and other moist and muddy spots, often assailed by the impudent attack of *Epinephele Janira* and *Melanagria Galathea*, which appear to be the foremost in attacking him when he thus condescends to leave for a while his lofty oak to visit the regions inhabited by his less honourable kindred. The partiality which this insect exhibits for individual sprigs of particular trees has often been remarked upon by entomologists, and is certainly confirmed by the Emperors of this neighbourhood. And it should almost seem as if this partiality were, if I may use the expression, hereditary; for upon a certain sprig of a small ash-tree, by the side of one of the ridings in Barnwell Wold, I have each year since 1847 succeeded in capturing the Purple Emperor; and in all instances, upon the capture of one, the identical sprig has in the course of a few days, if not within a few hours, been invariably occupied by another Emperor"—*William Bree;* the Lynches—*F. Bond;* Kettering—*William Sturgess.*

Nottinghamshire.—Occurs occasionally at Ollerton; in 1859 I had a fine female given me alive. It was taken inside a pigsty near the edge of Willow Wood, three miles from Ollerton—*R. E. Brameld;* occasionally near Newark—*George Gascoyne.*

Somersetshire. A friend informs me he has taken *Iris* at Clive Coombe, about two miles from Bristol—*F. D. Wheeler;* a specimen reported from Brockley—*W. H. Grigg.*

Suffolk. Bentley, Coombs, &c. *H. H. Crewe;* Redisham and Wolsingham Parks—*W. M. Crowfoot*; in Old-hall Wood very rare, Haverhill—*William Gaze;* Assingham Wood, near Sudbury—*John Grubb;* so common near Ipswich in 1868 that many of our collectors have taken eight or ten dozen each—*Garrett Garrett.*

Surrey. Haselmere—*C. G. Barrett;* formerly abundant near Godalming. The late Mr. Howard, of Elstead, used to take the females in his garden resting on the trunks of trees. I have seen at least a dozen so taken: the males were seen flying about the oaks, but I did not hear of one being taken—*E. Newman.*

Sussex. Poyning's Wood—*W. Buckler;* Plashet, between Balcombe and Newick, and elsewhere in the woody district of the Weald—*E. Jenner;* Chichester—*W. H. Draper;* Brighton, Bourne, and Ticehurst—*Stainton's "Manual."*

Wight, Isle of. Has been taken at Freshwater and Brading—*J. Pristo;* near Yarmouth—*F. Bond.*

Wiltshire. Said to have been taken in Savernake Forest, but this is very doubtful—*T. A. Preston.*

Obs.—A great deal which I thought it unnecessary to transcribe has been written as to the mode of capturing the Emperor with a net on the end of an enormously long pole: I know of no record of success with this strange instrument, and cannot imagine myself possessed of the power to use it. The unsavoury baits already described seem to offer a more likely chance of capture.

Family 6.—Satyrs (in science *Satyridæ*).

The caterpillar is without spines, but is covered with minute warts, which impart to the surface a velvety appearance; it is nearly cylindrical, but tapers towards both extremities, more particularly the caudal extremity, which terminates in two points directed backwards: the chrysalis is scarcely at all angled; the head is broad and obtuse; it is generally suspended by the tail, but sometimes lies without any attachment on the surface of the ground: the butterfly has only four legs adapted for walking; it has abruptly knobbed antennæ, rounded wings, and a feeble flight. There are six British genera—*Melanagria, Erebia, Pyrarga, Satyrus, Epinephele,* and *Cœnonympha.*



20. Marbled White (*Melanagria Galathea*).

20. Marbled White.—The hind margin of all the wings is scalloped but not angled: the colours are black and white in about equal proportions, and distributed in spots as shown in the figure; the costal margin of the fore wings is densely sprinkled with fulvous gold in the female. The under side is white, slightly suffused with ochreous gray, especially on the hind wings; the fore wings have various blotches of smoky black, as shown in the figure, and a white-pupilled black spot about equidistant from the tip, the costal margin, and the hind margin: the hind wings have various markings of smoky green-gray, with six eye-like spots forming a band parallel with the hind margin; this band is interrupted after the second spot counting from the costal margin; this interruption causes the wing to look as though there had originally been seven spots and the third had dropped out.

Varieties.—The species is not subject to variation, but some remarkable varieties have occurred. Mr. Thomas Marshall, one of our oldest and most assiduous entomologists, mentions one such at page 471 of the second volume of the "Zoologist." He says:—"At the latter end of last July I captured a very remarkable specimen of *Melanagria Galuthea* in a field on the heights between Dover and Walmer. The specimen is a male of a clear milky-white colour, and has not either on the upper or under side of the wings the smallest speck of black. Its thorax, body, and palpi are also entirely clothed with white. This specimen is in perfect condition."

Life History.—The parent female does not select any particular species of grass or herbage on which to deposit her egg, but settles indiscriminately on any leaf or stalk that may be nearest at hand, and drops her eggs at random, careless what species of grass may happen to receive it: only one egg is extruded at a time, and when this is disposed of, the female flies a few inches or a few feet and repeats the operation. Mr. Bignell, to whom I am indebted for this information, watched a number of females thus employed on the 26th of July, 1869. The eggs, extruded one by one, find their way by the simple power of gravitation to the roots of the grass, there to take their chance of hatching and future well-doing. The egg, which is perfectly hard and dry, and free from any glutinous covering, is white and almost spherical, but is slightly flattened at both its poles: the young caterpillar emerges in about three weeks, and, after feeding for a short time, hybernates very early in the autumn, and while yet extremely small: it conceals itself towards the roots of the herbage, and very near the surface of the ground: it feeds again towards the end of April or beginning of May, and attains its full size by the end of the latter month. When full fed it rests on a blade of grass in a nearly straight position, the back slightly raised, and the head slightly bent under; if annoyed it falls to the ground in a curved posture, which can scarcely be called a ring, but lies motionless, feigning death, until the prospect of immediate danger is past, when it slowly resumes its ordinary position, and reascends its food-plant. The head is of nearly the same width as the second segment, and is beset with scabrous points which emit hairs: the body is obese and somewhat fusiform, increasing in size to the fifth segment, thence it gradually diminishes to the anal extremity, which terminates in two parallel points above the anal flap, and directed backwards; the segmental divisions are not strongly marked, and each is divided transversely into sections, which are also obscurely indicated; the sides in the region of the spiracles are slightly, almost imperceptibly, dilated; every part of the body is beset, like the head, with scabrous points and short hairs: those of the head and second segment are slightly arcuate and bending forwards, those of the third segment nearly straight and erect, and those of the remaining segments arcuate and bending backwards. The colour of the head is pale dingy green or pale reddish brown; of the body paler dingy green or wainscot-brown, with a pretty clearly defined narrow mediodorsal darker stripe; the dorsal area on each side of this dark stripe is very pale, and its exterior margin almost white; a narrow sinuous reddish stripe intersects each division of this pale area; the lateral area is pale ferruginous, intersected by a narrow whitish stripe below the spiracles, which are intensely black; in addition to this principal broad lateral stripe or area, there are two other very inconspicuous stripes, the one above, the other below it; all the stripes unite, and terminate in the anal points, which are slightly tinged with pink; the ventral surface, legs, and claspers are pale ferruginous. On the 14th of June my caterpillars left their food, and lying at the bottom of the gallipot, underwent pupation two days subsequently, without attaching themselves in any way to the grass or other object; in fact they seemed to make no preparation whatever for the change: the chrysalis is short and obese; the head is rounded and without any appearance of ears; the thorax convex, but neither keeled nor angulated; the ventral surface is very gibbose,

more so than the dorsal; there is a prominent scale at the base of each wing-case, apparently covering the spiracle, and the thirteenth segment is attenuated, depressed, scale-like, and fringed with straight bristles, which appear to indicate the inability to suspend itself. The colour of the chrysalis is pale wainscot-brown, partially transparent; the scale at the base of the wing-cases and the caudal scale being dark brown, almost black; the wing-cases are delicately barred with transverse brown lines, very faint indeed, but slightly darker than the ground colour; the dorsal suface of the body is indistinctly striped with a darker shade.—*Newman.*

Time of Appearance.—The caterpillar through the winter and spring, the chrysalis in June, the butterfly in July.

Localities.—I believe this butterfly to be entirely absent from Ireland, Scotland, and the Isle of Man. From many of the northern counties of England it also appears absent. It is not mentioned in Mr. Wailes' admirable catalogue of the Lepidoptera of Northumberland and Durham, and I have no record of its occurrence in Cumberland, Westmoreland, Lancashire, Cheshire, Derbyshire, Shropshire, Staffordshire, or Lincolnshire; but from Yorkshire I have several records. In the other midland, and in all the southern counties, it occurs not uncommonly, but always in restricted spaces, generally confining itself to a single field or rough pasture. It is very partial to rough ground, and seems to avoid the shelter of woods.

Berkshire. At Burghfield, near Reading—*—C. S. Bird.*

Buckinghamshire. Drayton Beauchamp and Claydon—*H. H. Crewe;* at Halton once only—*J. Greene.*

Cambridgeshire. Near Duxford—*F. Bond;* common throughout the county—*Thomas Brown.*

Cornwall. Werrington Park, Launceston, Penheale, Egleskerry—*Geo. C. Bignell.*

Devonshire. Various localities in the county—*J. Hellins;* along the Devon coast from Dartmouth to Babbington—*Geo. C. Bignell;* Plymbridge—*E. James, jun.;* in a limestone quarry at Berry Pomeroy, Buckfastleigh, Exeter, Axminster, Sidmouth—*J. J. Reading.*

Dorsetshire. A single specimen was taken at Glanville's Wootton in 1689 by C. W. Dale: it formerly occurred there in plenty; common at Lulworth, Charmouth, Blandford, and Dorchester—*J. C. Dale.*

Essex. Epping—*Edward Doubleday;* I have taken three or four specimens on the railway banks near Lexden; it has disappeared from Hartley Wood, St. Osyth's, where it was formerly common—*W. H. Harwood;* common at Herne Bay—*H. D. Greville.*

Glamorganshire. Common in the county—*Evan John;* I have occasionally seen it near Ynisygerwn—*J. T. D. Llewelyn.*

Gloucestershire. Common on all the hills about Wootton-under-Edge—*V. R. Perkins;* abundant in many localities—*Joseph Merrin;* Bussage and the neighbourhood, Bacon Tump, Daneway Common, Folley Lane, Sapperton—*M. G. Musgrave;* Common at Guiting—*Joseph Greene;* near Stroud—*Alfred E. Hudd.*

Hampshire. Leigh Wood and Durrance Common—*W. Buckler;* Lyndhurst, New Forest—*F. Bond;* Woolmer Forest—*C. G. Barrett;* there is a locality for this insect near Fordingbridge, in the same meadow in which Artemis occurs—*H. Ramsay Cox;* Parley Heath, Bishopstoke, near Winchester—*J. C. Dale;* Southwick, Witham Hill, near Petersfield—*Henry Moncreaff;* Emsworth—*W. H. Draper.*

Herefordshire. Oakley Park, abundant—*F. E. Harman.*

Hertfordshire. Woodcock Hill, near Elstree—*F. Bond.*

Huntingdonshire. Monk's Wood, in profusion—*J. H. White;* near Sawtry—*F. Bond.*

Kent. Folkestone, East Cliff, fields round Dover Castle, plentiful—*G. H. Raynor;* Darenth Wood, in profusion twenty years ago in one particular spot, nearly destitute of trees, in which *Chelonia Plantaginis* also abounded; also in a little chalk-pit at Greenhithe—*E. Newman;* Lees Court Park, Chilham Park, and above Dane Court, Chilham—*H. A. Stowell;* Gravesend—*W. Machin;* very abundant at Herne, also at Margate and

Folkestone — *H. Ramsay Cox;* abundant everywhere on the chalk downs near Folkestone—*W. Oxenden Hammond.*

Middlesex. Kingsbury, and near Edgeware—*F. Bond.*

Monmouthshire. Common near Heullis' Wood—*George Lock.*

Norfolk. Kirby Lane, near Beccles, but confined to a single marsh—*W. M. Crowfoot.*

Northamptonshire. Near Barnwell Wold —*F. Bond;* plentiful in Barnwell and Ashton Wolds in July—*William Bree.*

Nottinghamshire. Common at Kirton, near Tuxford, also at Worsop and Mansfield —*R. E. Brameld;* in one field at Egmanton, near Tuxford, in profusion—*George Gascoyne.*

Somersetshire. Clevedon, Portishead — *F. D. Wheeler;* Bedminster—*A. E. Hudd.*

Suffolk. Beccles—*C. G. Barrett.*

Surrey. Between Busbridge and Highdown's Ball, near Godalming, Hindhead, Mickleham, Headly Lane, in one field only —*E. Newman;* Haslemere—*C. G. Barrett.*

Sussex. Very abundant at the Holmbush, and here and there in other places, but very local—*E. Jenner;* very numerous in Abbot's Wood—*C. V. C. Levett;* near Horsham and near Brighton, in both instances confined to a very small space—*E. Newman;* Lewis — *Stainton's "Manual."*

Warwickshire. In woods near Knowle, but it has not been taken for many years — *Frederick Enock.*

Wight (Isle of). Near Yarmouth—*F. Bond;* Ventnor, Parkhurst, Whiteford Wood, Bembridge—*Alfred Owen;* abundant in rough pastures, but remarkably local—*James Pristo.*

Wiltshire. Great Bedwyn, Savernake Forest, seen near Westlands—*T. A. Preston.*

Worcestershire. Meadows at Himbledon, and near Monk's Wood, but uncommon of late years—*J. E. Fletcher;* a single specimen has been taken at Great Malvern; it occurs plentifully a few miles from Malvern—*W. Edwards.*

Yorkshire. Near York—*Robert Cook;* Scarborough and Sheffield—*Edwin Birchall;* common in Yorkshire—*T. H. Allis;* it used to be found in Melton Wood, near Doncaster, but has been extinct since a field that bordered the wood was ploughed; I do not think it is ever now found near Doncaster—*Alfred Ecroyd.*



21. The Small Ringlet (*Erebia Epiphron*). Upper side.



Under side.

21. The Small Ringlet.—The wings are rounded and of a deep sepia-brown colour, with a broad but indistinct ferruginous transverse band parallel with the hind margin of all the wings; this band is divided into compartments by the wing-rays, which are of the sepia-brown ground-colour; in each of the compartments there is usually a circular black spot, and the compartments themselves in the hind wings frequently assume a circular form. The under side is very similar to the upper, but the colours are more suffused, and their boundaries less distinct: in some specimens the rust-colour is suffused over the central disk of the fore wings: in the hind wings the ferruginous spots are very small, and the black pupil in each is reduced to a mere dot.

Varieties.—When Mr. Weaver discovered this insect in Scotland as presently related, I could not satisfy myself that it was identical with the butterfly of the Lake District, but supposed it to be the Papilio Melampus of Esper. Under this mistaken impression I published a detailed description at page 732 of the second volume of the "Zoologist,"

There is another form not uncommon on the Continent which had been raised to the rank of a species, but now is universally considered a mere variety; it is distinguished by the presence of white pupils to the black spots on the wing: this variety was described as a species by Knoch, in 1783, under the name of *Epiphron;* and ten years subsequently the form without the white pupils was described by Fabricius under the name of *Cassiope;* again, still later, our own Haworth described the same insect under the name of *Mnemon.* In accordance with the usage of science the earliest name only is retained.

Life History. — Of this very little is known; the only record in my possession is from the pen of Mr. Wailes, at page 200 of the second volume of the "Transactions of the Tyneside Naturalists' Field Club," and is in the following words: "Having this summer (1857) captured *Erebia Epiphron* on the mountains near Sprinkling Tarn, Cumberland, and obtained a few caterpillars from eggs deposited by one of the specimens, which, however, I regret to say, have since all died, both those in my possession and those given to my friends, I may as well place on record a description of them, as the caterpillar was previously entirely unknown: pale green, with numerous darker green longitudinal lines shading into the ground-colour, and with a well-defined white line along each side in the region of the spiracles. The caterpillars fed upon the annual meadow grass (*Poa annua*), and the sheep's fescue grass (*Festuca ovina*), though I suspect that in a state of nature they live on the young leaves of the small mat grass (*Nardus stricta*), or some of the smaller rushes (*Juncus*) which constitute the principal herbage on the mountain sides where the insect is met with."—*Wailes.*

Time of Appearance. — Caterpillar in autumn, and again in spring, doubtless hybernating at the roots of the mountain herbage; butterfly in June and July.

Localities.—A very local species in the British Islands. Mr. Birchall gives a single Irish locality—"Croagh Patrick, near Westport: the locality is about half-way up the mountain on the Westport side, in a grassy hollow, where a little hut is erected for the shelter of the pilgrims. I captured a fine series here in June, 1854." It has not been taken in the Isle of Man.

The first notice of the occurrence of this butterfly in Scotland is from my own pen, and is published at p. 682 of the "Zoologist" for 1844. Eight specimens are recorded as having been taken, but subsequently, at p. 729 of the same volume, I have recorded that a considerable number, a great majority of which were males, were taken in the district of Rannoch, in Perthshire, by Mr. Weaver, who wrote thus respecting them: "I took these butterflies when the sun shone, morning and evening, the first on the 27th of June, and the last on the 27th July. They appeared confined to a spot of level and rather marshy ground about 150 yards in length and 50 yards in breadth; it was grassy, but without heath; and although there was plenty of heath all round the neighbourhood I did not see a single specimen settle on it. The locality is among rocky mountains, some of which attain an altitude of 4,000 feet above the sea level; and I think that one locality where I found the butterfly is at least 3,000 feet above the sea level. I spent ten days in hunting them, and although I wandered over most of the country for ten or fifteen miles round, I found them nowhere else. The nearest village is Kinloch Rannoch, consisting of a few scattered houses, one of which is a shop for sundries, two are pothouses, and the remainder are principally the residences of shepherds. It has no road to any other place." At p. 166 of the first volume of the "Entomologists' Weekly Intelligencer," Mr. Young, of Paisley, says that in the first week in August, 1856, he took a good number of this species on Ben Lomond. At p. 132 of the seventh volume of the "Entomologists' Weekly Intelligencer," Mr. Bibbs, of Worcester, gives us another Scotch locality:—"The spot where I captured them was on the road-side skirting Loch Vennachar, leading from Callander to the Trossachs, about two miles before I reached that romantic pass. Near the spot I observed

a patch of cotton-grass (*Eriophorum*) about half an acre in extent." Dr. Buchanan White observes of this insect that "it is the only truly alpine species indigenous to Britain. In Scotland it occurs at a considerable elevation on the mountains on both sides of Loch Rannoch, and on the North of Loch Tay." Mr. Birchall has also taken it on Ben Nevis.

In England the range of this butterfly is almost, if not entirely, confined to the Lake District, which term I would apply to the county of Westmoreland, the south of Cumberland, and that isolated portion of Lancashire which is north of Morecambe Bay. At page 409 of the third volume of the "Entomological Magazine," Mr. Heysham, of Carlisle, writes thus:—"On the 4th of July last I found this species in considerable abundance in the vicinity of Sprinkling and Styehead Tarns, at the head of Borrowdale; the female appears to be rare, and the few that I captured were much wasted, although many of the males were still in fine order."—*T. C. Heysham.* Mr. Curtis, however, at p. 205 of his exquisitely beautiful "British Entomology," expresses an opinion the very reverse of Mr. Heysham's; and as he was in company with Mr. Dale, one of the very best and most accurate of all entomological observers, I incline to adopt his view of the matter in preference to Mr. Heysham's. "The males," says Mr. Curtis, "in forward seasons have appeared as early as the 11th of June; but last year, when Mr. Dale and I visited Ambleside, they were later, the first being taken on the 18th of June, and they did not become plentiful until the 25th. They are found among the coarse grass that covers considerable spaces, abounding with springs, on the sides of the mountains; they fly only when the sun shines, and their flight is neither swift nor continued, for they frequently alight amongst the grass, and, falling down to the roots, their sombre colour perfectly conceals them. The females are later, and have been seen even in August. We found the males on Red Skrees, a mountain near Ambleside; and Mr. Marshall took them at Gable Hill and Styehead, between Wastwater and Borrowdale." Mr. R. Bowman Labrey, at p. 171 of the first volume of the "Entomologist," informs us he "took a few specimens on the 23rd June, near the edge of Styehead Tarn, between Borrowdale and Wastdale, in Cumberland. The day being generally cloudy, I only saw them on the wing during a temporary gleam of sunshine." At p. 198 of the sixth volume of the "Entomologists' Weekly Intelligencer," Mr. Crewe says: "On the 30th June, while ascending Helvellyn, I observed this species flying about in plenty, about three parts up the mountain, over some boggy patches of ground. To these spots it appeared confined, for higher or lower not a single specimen was to be seen: they were getting rather worn." Mr. J. B. Hodgkinson informs me he took *Epiphron* at Langdale Pikes, rather to the west side, at the end of June.



22. Northern Brown (*Erebia Medea*). Upper side.



Under side.

22. Northern Brown.—The hind margin of the wings is rounded and scarcely at all scalloped; the colour is a rich velvety sepia-brown, each wing having a broad but not very clearly defined rust-coloured band parallel with the hind margin; in this band there are usually four circular black spots in the fore wings and three in the hind wings; the first and second of those in the fore wings are always united, and each has a pupil of snowy whiteness; the third spot is smaller and less constant; its white pupil is very small if present,

but is sometimes entirely absent; the fourth is larger and almost invariably distinct: the rust-coloured band of the hind wings is divided into compartments by the wing-rays, which are of the dark-ground colour; each of the three principal compartments contains a circular, small, and ill-defined round black spot, with a white pupil. The under side of the fore wings is dark brown, with a broad fulvous band parallel with the hind margin; in this band are the same ocellated black spots as on the upper side: the hind wings are blue gray or fulvous gray, with two broad transverse bands of a darker tint; the first of these is median, the second marginal; in the area between these bands are two, three, or four minute white spots, each with a dark circumscription.

Obs.—It would, perhaps, be more precise to describe the under side of the hind wings as divided transversely into four compartments, of which all except the basal compartment are in the form of bands; the third compartment is always lighter than the second and fourth, but is not always of the same colour; it is sometimes fulvous brown, and sometimes blueish ash coloured; the first or basal compartment of the wing generally corresponds in colour exactly with the third; but this is not always the case, for in several specimens in my collection the first compartment is perfectly concolorous with the second. The different tinting of these compartments has induced entomologists to establish numerous varieties, but the propriety of this course seems to me rather questionable. On this subject Mr. Wailes has remarked, at page 41 of the first volume of the "Entomological Magazine," "that the males never have the broad brown band underneath the hind wings instead of the blueish ash one, whilst the females may be considered as divided into two great varieties equally common, distinguishable not only by the colour of that band, but by the greater distinctness of the ocelli." Accepting this view, it would appear that the normal colour of the third compartment in the male is blueish ash, but that a variety of the female frequently occurs in which it is fulvous brown.

Obs. 2.—It seems desirable to notice the change of a familiar name: the Blandina of Fabricius, published in 1794, is the same as the Medea of the Vienna Catalogue, published in 1776: Mr. Doubleday has pointed out this fact, and we have no choice but to revert to the older name.

Life History.—At page 199 of the third volume of the "Transactions of the Tyneside Naturalists' Field Club," Mr. Wailes first announced the discovery of the eggs and caterpillars of this species. The eggs he does not describe, but Mr. Buckler has supplied this omission at page 65 of No. 75 of the "Entomologists' Monthly Magazine": Mr. Buckler says, "The egg may be called large for the size of the fly, and is nearly globular, though somewhat ovate in shape, and placed on end; the shell is glistening and ribbed, but not deeply, with about thirty longitudinal ribs, and with very shallow transverse reticulations, in colour pale greenish-yellow, afterwards pale pinkish-gray, speckled with claret-brown." To proceed with Mr. Wailes's discovery, that gentleman says, "I have succeeded in obtaining a few eggs, which hatched about fourteen days after they were laid, and the young caterpillars fed freely on several species of meadow grass (*Poa*) in October, when they ceased feeding preparatory to hybernation; they had undergone their second moult, and were then pale green, with a dark green or brownish stripe down the back, and two white ones narrowly bordered by the same dark colour on each side. In the lower white stripe on each side are the spiracles: the posterior extremity is attenuated and slightly furcate, as in other caterpillars of the family."

I am able to add the description of a caterpillar when full fed, which was on the 1st of July, 1870: it rested in a nearly straight position on the stalks or leaves of the brown bent grass (*Agrostis canina*), and it fed in confinement exclusively on the latter, but I cannot say whether this is the case in a state of nature: these leaves appear to possess a revolute margin, and hence to assume a somewhat tubular character: when annoyed the caterpillar seemed to grasp more tightly with

its anal claspers, and when compelled to relinquish its hold, it fell among the grass and assumed a somewhat crescentic form, the two extremities approaching, and in this position it remained a while perfectly motionless; after sufficient time had elapsed for the disappearance of the supposed enemy, it began to crawl, but all its movements were remarkably sedate, or even lethargic. The head is rather narrower than the second segment, into which it is partially received; it is scarcely at all divided on the crown, has a slightly convex face, and a rough surface resembling shagreen, and composed of approximate warts, each of which emits a hair from its summit; the body is obese, decidedly thickest in the middle, and diminishing towards both extremities; the division into segments is not very manifest, and is rather concealed by a division of each segment into four sections, each of which seems composed of a transverse series of warts; thus the eye is attracted by the minor divisions, and the major divisions, or segments, properly so called, may readily escape notice; the body terminates in two short and blunt processes directed backwards; the legs and claspers form two approximate series under the belly, and are not perceptible from above, whether the caterpillar is at rest or in motion. The general colour of both the head and body is wainscot-brown; the ocelli are black, and one on each side is unusually prominent, appearing almost pedunculate; the body has a narrow medio-dorsal stripe almost black, and the colour on each side of this is paler than the general ground colour, thus rendering the medio-dorsal stripe more conspicuous; the spiracles are intensely black; half way between the spiracles and the medio-dorsal stripe is a side stripe, paler than the general ground colour, but bordered, especially below, by a darker margin, which is broken up into elongate spots, but these are rather vague, and not very noticeable; the legs, claspers, and under surface are nearly of the same tint as the dorsal surface; the warts are of a very pale hue, almost white, each having in the centre a small black hair. It was full fed at midsummer.—*Newman.*

I am indebted to Mrs. Hutchinson, of Grantsfield, near Leominster, for the opportunity of describing this interesting caterpillar, which, however, I only saw in that lady's possession. Mr. Buckler has been fortunate in obtaining an interview with the chrysalis also. His caterpillar assumed this state on the 22nd of June. It was not attached by the tail in the usual fashion of the *Satyridæ*, but was placed in an upright position amongst the grass, near the ground. "The CHRYSALIS," says Mr. Buckler, "is nearly five-eighths of an inch in length, the wing-cases long, the body plump, thickest in the middle, tapering to the tail, and ending in a blunt flat spike; the back of the thorax is rounded, the head and eye-pieces prominent. At first the head, thorax, and wing-covers were semi-transparent and of a pinkish-gray tint, the body ochreous, with dark dorsal stripe, and other lines and spiracles also as in the caterpillar; but by the 10th of July the eyes became black; the thorax, antenna-cases, and wing-covers, after passing through an opaque cream-coloured stage, finally changed to a dingy dark pinkish brown. The butterfly, a very fine male, came forth on the fifteenth July."—*Buckler.*

TIME OF APPEARANCE.—The young caterpillar is to be found in September and October, the full-grown caterpillar at the end of June, when it changes to a chrysalis, and the butterfly is on the wing in July and August.

LOCALITIES.—I am not aware of this species having been found in Ireland or the Isle of Man. In Scotland it is common. Mr. Douglas took it in the pass of Killikrankie in 1832. At page 167 of the second volume of the "Entomologists' Weekly Intelligencer," Mr. T. Chapman, of Glasgow, informs us that this species was in plenty in rushy flats during the second week in August, 1857, extending for twelve miles along the east side of Loch Long. And at page 171 of the same volume, Mr. Jazdowski writes:—"I have been spending the last few days at Braemar, and on one of the hills near the village I found *Erebia Medea* in great numbers. The hill was almost entirely covered with birch and pine trees, and the insect occurred in an open space near the top of the hill. The ground here was

covered with coarse grass, heather, and ferns: the insect was flitting about chiefly among the ferns, and was so numerous that in two excursions I caught upwards of three dozen." And, again, Mr. Somerville, at page 181 of the fourth volume of the same journal, writes, on the 25th of August, 1858 :—"During the past few weeks I have taken a number of fine specimens of this insect on the borders of Dumfriesshire." Mr. Birchall informs me he finds it in the Highlands generally. Dr. Buchanan White says it "occurs abundantly in some of the Highland valleys of Perthshire, as at Pitlochrie, Rannoch, &c., but is rather local. This species does not range so far up the mountains as *Cœnonympha Davus*, for, from some observations made last summer in Inverness-shire, it appears that *Erebia Medea* was scarcely seen above eight hundred feet, while *Cœnonympha Davus* attained an elevation of upwards of two thousand feet; the two species being found together from two hundred feet up to eight hundred feet above the sea level. Both species are, I believe, found at the sea level." Dr. White took *Medea* on the 30th July in 1867, and on the 21st July in 1869. Writing of Strathglass, in Inverness-shire, Dr. White adds :—"The most universally distributed butterfly was *Erebia Medea*, which absolutely swarmed in all the open marshy places in the woods, sometimes even coming into the gardens."-*Entomologists' Monthly Magazine*, No. 74, p. 47.

In England I have but few localities to record.

Durham. "This, the most interesting of our local butterflies, was first met with in England by the late Mr. William Backhouse, in Castle Eden Dene, about thirty-five years ago. In 1829 I find he had the pleasure of capturing it in the above locality, where it abounds in the early part of August in the more open grassy places of the Dene. I may here mention that Castle Eden Dene is the largest and most beautiful of a series of romantic dells, or denes, which consist, as it were, of immense clefts or chasms in that part of the secondary series of rocks termed the magnesian limestone. These denes are, for the most part, narrow and confined, and so densely covered with wood as to render them too close for the active pursuit of the entomologist: but as the chasms approach the sea-coast, where they all terminate, the banks lose their very precipitous appearance and expand into valleys. Small brooks, locally termed *burns*, run through them, but from the porous nature of the limestone the waters seldom reach the sea; and in Castle Eden Dene, where the stream is larger, and fed by two or three small rivulets, at the distance of, perhaps, a mile apart, the supply poured down by one disappears, and in one place very suddenly, ere it reaches that part of the main water-course where the next empties itself. In winter, however, the melting of the snow and heavy rains apparently convert the dry bed into a torrent; and, judging from the width of the channel, a large body of water must rush down the valley. Castle Eden Dene is about four miles long, and averaging nearly a quarter of a mile in width, though in some places the rocks, often a hundred feet perpendicular, reduce its breadth to half that distance. Vegetation is most luxuriant, and its botanical treasures have long rendered it famous in the works on that part of natural history. Suffice it to say, the rare Lady's Slipper (*Cyprepidium calceolus*) is here, and almost here only, to be met with. Towards the sea the banks have a more barren appearance, and assume the peculiar marks of the tract of rocks to which the district belongs, producing a great variety of the grasses and other plants delighting in an arid and poor soil. Here the juniper and privet are, by the force of the winds, thrown into those curious flat growths which must have struck every one who has seen the trees and bushes growing on an exposed sea-coast. The banks of the Dene are generally moist, consequent on the density of the foliage and numerous springs in the limestone: but here and there dry, exposed grassy spots occur; and on the principal of these, nearly opposite the mansion of the proprietor—Mr. Rowland Burdon—the beautiful *Erebia Medea* is to be found in abundance. I have been thus diffuse in

describing the place, because I am persuaded that the connexion between entomology, geology, and botany—especially the two former—has not been sufficiently attended to; and, from my own short experience, I think a pretty good idea may be formed of the insects likely to be found in any district if its geological features are taken into careful consideration"—*George Wailes*, in "Entomological Magazine," vol. i., p. 61. When at Castle Eden Dene, in 1841, this insect was very abundant. I found them settling on the blossoms of the marjoram (*Origanum vulgare*). There is no heath in the neighbourhood, and I think this may account for the Castle Eden Dene specimens differing from the Scotch ones—*J. C. Dale* in "Entomologist," vol. i., p. 191. Still plentiful at Castle Eden Dene in 1869—*William Maling.*

Cumberland. I have only seen one specimen taken at Coldbeck, Sebergham—*J. B. Hodgkinson.*

Lancashire. Abundant in the county at Grange, Arnside, and Silverdale—*J. B. Hodgkinson.*

Westmoreland. Abundant at Witherslack—*J. B. Hodgkinson.*

Yorkshire. Colne—*Edwin Birchall.* Common at Grassington, above Settle—*T. H. Allis.*



23.—Speckled Wood (*Pyrarga Egeria*).

23. Speckled Wood.—The wings are rounded, but the hind margin of all the wings, more particularly of the hind wings, is scalloped: the colour is smoky brown, the fore wings having eight or nine differently-shaped pale brown spots, the position of which will be more clearly understood by a reference to the figure than from any definition of mine; the largest of these spots is situated near the tip, and is divided into three compartments by the wing-rays, which are dark; the middle compartment encloses a nearly circular black spot which has a snow-white pupil: the hind wings have six or seven pale spots, the four largest of which constitute a band parallel with the hind margin; three of these generally contain a black spot with a white pupil; the middle spot of these three is the largest and most distinct; and the fourth, that nearest the apical angle, is almost invariably without the white-pupilled spot. The under side of the fore wings very much resembles the upper side, but that of the hind wings is suffused, clouded, and marbled with different shades of fulvous brown, the ocellated spots of the upper side being discernible, but very indistinct. The eyes of this species are hairy.

Obs.—The character of hairy eyes is common to this and the following species: they are very properly associated as the genus *Pyrarga* on account of this peculiarity.

Life History.—The eggs are laid singly on the stalks or leaves of several species of grass, and are almost spherical in figure, the entire surface being reticulated with minute ridges, which divide it into hexagonal cells, and give it the appearance of being honeycombed: the young caterpillars emerge in eight or ten days, and feed on the leaves of grasses: at first they are of a dingy brown colour, except the head, which is black, and exhibit but little indication of stripes; after the first moult they lose their black heads and assume green ones; they hybernate early, and are full fed by the end of the following March, when they rest in a perfectly straight position on a blade of grass. The head is subglobose, wider than the second segment, and scabrous, the raised points which cause the scabrosity emitting small but rigid bristles: the body is slightly shuttle-shaped, the attenuation being more manifest towards the anal extremity; the incisions of the segments are deeply and conspicuously marked; the segments are again transversely wrinkled or divided into narrow sections; the entire surface is slightly scabrous, and

covered with very minute but stiff bristles; the anal extremity is produced into two parallel points directed backwards. The colour of the head and body is either dull olive green or dull pale umber brown; in either case the body has three compound or triple stripes; one of these is dorsal, and is composed of a medio-dorsal dark smoke-coloured stripe, and two yellowish or whitish marginal stripes, the dark medio-dorsal stripe being in some specimens again divided by a very narrow and indistinct white stripe; this median compound stripe terminates with the twelfth segment; the other compound stripes are lateral, composed of the same colours, and terminating in the anal points. Early in April the caterpillar spins a slight silken covering on a stalk, stem, or blade of grass, and, suspending itself therefrom by the anal claspers, is changed to an obese CHRYSALIS, with the head broadly notched; the thorax, wing-cases, and body are gibbose, and suspended in an oblique position by numerous small hooks at the anal extremity: the skin of the caterpillar always remains attached to the anal extremity, even after the butterfly has escaped: the colour of the chrysalis is dingy green or brown, the antenna-cases are barred, and the wing-cases streaked with dark brown or black; the back is also freckled with black, and has four or six white dots.—*Newman.*

Obs.—Sepp observed the young caterpillars to moult five times before hybernating, namely, on the 11th of August, when eight days old; on the 18th and 27th of the same month; and on the 4th and 15th of September; and that they ate their own skins.

TIME OF APPEARANCE.—The caterpillar may be found hybernating throughout the winter, and full fed at the end of March; the chrysalis at the beginning of April; and the butterfly from the 10th to the 20th of the same month.

Obs.—The opinion appears universally to prevail that this species is double-brooded, and in this (reasoning from analogy) I feel inclined to concur, although I have never seen an æstival brood of caterpillars, nor is such mentioned by Sepp; but Lewin says this species "goes through its different changes exceedingly quick, so that there are not less than three distinct broods in the year;" and Mr. Doubleday informs me that this is in exact accordance with his own observations.

LOCALITIES.—I believe the Speckled Wood to be distributed more or less abundantly in every part of the United Kingdom, with the exception of the Isle of Man and the north of Scotland. Mr. Birchall says it is generally abundant throughout Ireland; Dr. Buchanan White informs us it is "a very local species in Perthshire, and never appears to be abundant. It occurs on Kinnoull Hill and near Muirhall, and is double-brooded. In Scotland it has not been recorded beyond the north of Argyleshire." Dr. White gives the following dates of its occurrence:—"1858, May 6; 1859, July 8; 1860, May 1; 1869, April 26 and August 8." I believe it occurs in every English and Welsh county. Mr. Jenner-Fust omits it from his seventeenth and eighteenth provinces, comprising Wales: in both these so-called provinces I know it to be very plentiful.



24.—The Wall (*Pyrarga Megæra*). Upper side of Male and Female.

24. THE WALL.—The wings are rounded, and the hind margin of the hind wings is slightly scalloped; the colour of all the wings

is tawny fulvous, transversely barred with smoky brown, the distribution of which colour differs greatly in the sexes; in both sexes there is a large and conspicuous circular black spot near the apical angle of the fore wings; this has invariably a snow-white pupil; the hind wings have a series of three nearly



Under side of Female.

circular black spots parallel with the hind margin, and two of these—those nearest the anal angle—are always white-pupilled. The underside is beautifully mottled and marbled with different shades of fulvous brown; nearly parallel with the hind margin is a series of six small circular white-pupilled black spots, each of which is surrounded with four rings, the first and third of which are fulvous, the second and fourth dark brown. The male differs from the female in being smaller, and in having a broad, oblique, dark brown band extending from the middle of the fore wing to the middle of its inner margin. The eyes are hairy.

Life History.—This species is double-brooded: the eggs which produce the first brood of caterpillars are laid on the cock's foot grass (*Dactylis glomerata*) and several other species of grass at the end of May; the caterpillar is full fed about the middle of July, when it rests by day in a nearly straight position on a blade of grass, feeding chiefly by night. The head is subglobose, exserted, and wider than the second segment, which is restricted in front. The body is somewhat fusiform, gradually decreasing to each extremity; it is decidedly convex above, and somewhat flattened beneath; the dorsal surface is transversely wrinkled, the wrinkles dividing each segment into six sections, of which the anterior is the largest; the body terminates in two parallel points directed backwards; the entire surface, both of head and body, is covered with minute warts, which impart a scabrous appearance to the caterpillar; each wart emits a short bristle; on each side below the spiracles is a decided but inconspicuous skinfold. The colour is apple-green, the head and an indistinct narrow medio-dorsal stripe being rather darker; the latter appears to be little more than the food in the alimentary canal showing through the cuticle; it is sometimes entirely absent; there is a lateral stripe of a rather paler colour, and also a narrow and very indistinct stripe exactly intermediate between the medio-dorsal and lateral stripes; the minute warts are generally, but not invariably, white; the bristles either black or white; the legs are semitransparent and almost colourless; the claspers are concolorous with the body, and the anal points are tipped with pink. My specimens changed to chrysalids, suspended by the tail, on the 14th of July; the chrysalis is rather obese; the head is broad and rather square, but slightly notched or excavated in the middle, the angles being almost right angles; the thorax dorsally humped and keeled, laterally angled at the base of the wing-cases; the dorsal surface of the body has a lateral series of six points on each side. The colour is apple-green; the angles of the head, the lateral and dorsal angles of the thorax, and five equidistant raised dots on each side of the dorsal surface of the body, are white, tinged with yellow.—*Newman.*

Time of Appearance.—The caterpillar may be found hybernating throughout the winter, the chrysalis in April, and the butterfly in May: the second brood of caterpillars occur in June, the chrysalids in July, and the butterflies in August.

Localities.—Mr. Birchall informs us that this butterfly is generally abundant throughout Ireland; it also appears in the Manx list, which he has kindly sent me. Dr. Buchanan White says "it was formerly common near Perth; he has heard of no specimen being taken since 1860, in which year it was common. The series of cold summers following that year seem to have destroyed the species; though

possibly, like *Pyrameis Cardui*, it may again put in an appearance. It is found in Scotland as far north as Argyle." It is a common butterfly in all parts of England and Wales.



25.—The Grayling (*Satyrus Semele*). Upper side of Male.



Upper side of Female.



Under side of Male.



Under side of Female.

25. The Grayling.—The fore wings are blunt at the tip, the hind wings have the hind margin scalloped; their colour is dull brown, with an irregular wainscot-brown band occupying nearly the outer half of the wing; in the fore wings this band is almost interrupted in the middle, and each of the divisions has a large and almost circular white-pupilled black spot; the hind wings have but one smaller white-pupilled black spot. The under side has the disk of the fore wings fulvous, inclining to ferruginous at the base, the outer or fulvous portion having two very distinct circular white-pupilled black spots; the hind wings are mottled and marbled with various tints of gray and brown, the basal portion being darker, and the darker portion bearing a very obvious similarity to the familiar profile of the late Lord Brougham. Such is a description of the female; the male, more especially on the upper side, is suffused with brown, and the markings I have described are very indistinct.

Varieties.—This insect is not subject to much variation, properly so called; but Mr. Bond possesses some extraordinary abnormities, the peculiarity of which consists in the presence of the colouring of both sexes in a single individual. Perhaps a little amplification may render this kind of abnormity somewhat more intelligible. Let us call four specimens of *Semele* Nos. 1, 2, 3, and 4, and the four wings of each A, B, C, and D; then in No. 1 the wings A and C will be male wings, and the wings B and D will be female wings; in No. 2, B will be a male wing, and A, C, and D female wings. Mr. Bond has some very extraordinary examples of this phenomenon, and exhibited them at a late meeting of the Entomological Society, as reported at p. 2070 of the second series of the "Zoologist." With his customary kindness and zeal for the advancement of science, Mr. Bond has offered me all these specimens to illustrate this work; but I could not accept them, having already declined innumerable offers of hemigynous, or, as they are incorrectly termed, "hermaphrodite" specimens of butterflies, more especially among the *Lycænidæ*.

Life History.—Three valuable accounts

of the preparatory states of this insect have been written by as many excellent entomologists. Sepp, the inimitable Dutch artist, was the first; Mr. Logan, of Edinburgh, the second; and Mr. Buckler, of Emsworth, the third. Mr. Buckler's description is published in the "Entomologists' Monthly Magazine" for January, 1866, and is reprinted in the "Zoologist" for August of the same year. It seems, however, that Mr. Buckler was indebted to the Rev. John Hellins, of Exeter, for the details. Mr. Hellins received the EGGS on the 26th of July and 3rd of August, 1864. Some of them hatched on the 8th of August, and the young CATERPILLARS continued coming out for three or four days. At first they were fed on that most objectionable of all grasses known as creeping wheat grass, couch grass, squitch or spear grass (*Triticum repens*). They were of an ochreous colour, with a black interrupted medio-dorsal stripe; they were very sluggish, often hiding low down, and hybernating when about four lines in length. One caterpillar only survived the winter, and this was presented to Mr. Butler on the 13th of May. "The caterpillar," says Mr. Buckler, "had shown a partiality for the turfy hair grass (*Aira cæspitosa*) previous to my receiving it, and on this it was therefore placed, being then about eight lines in length. On the 20th of May I chanced to dig up a rather larger caterpillar of this species from a waste piece of sandy ground near the sea, amongst early hair grass (*Aira præcox*) and other small grasses, which rendered the task of rearing doubly interesting, in observing the habits of each, kept separate and on different food. The captured caterpillar, on being placed under a glass in a pot with its native growing food, immediately burrowed in the sandy earth, and the few times it was seen on the grass was always at night, and each morning brought evidence of its doing well by the diminished grass. About the 14th of June these indications ceased, and on the 23rd I searched for the CHRYSALIS, and found it in a hollow space a quarter of an inch below the surface, the particles of sand and earth very slightly cohering together, and close to the roots of grass, yet free from them. The chrysalis was obtuse, rounded, tumid, and smooth, the abdominal rings scarcely visible, and wholly of a deep red mahogany colour. The perfect insect, a male, appeared July 24th. The caterpillar, reared wholly in captivity from the egg, always remained on its rigid food, with its head uppermost, when feeding, which at first it did day and night till it was an inch long, from which time it fed only at night, remaining all day at rest on the grass, with its head downwards, in comparative darkness, amongst the lower parts of the stems. It never showed any disposition to burrow, though the soil was supplied for the purpose, until it was full fed, about the middle of June. The butterfly, a male, appeared on the 5th of August. No material difference existed between the two caterpillars, excepting that the captured one was rather less bright and distinct in colour and markings than the other. The full-grown caterpillar is an inch and a half in length, tapering much to the anal forked extremity and a little towards the head, which is globular. The ground colour of the back is a delicately mottled drab, with longitudinal stripes, broadest along the middle segments, viz., a dorsal stripe of olive-brown, very dark at the beginning of each segment, with a thin edging of brownish white. Three stripes along the subdorsal region, of which the first is composed of a double narrow line of yellowish brown, the second wider, of the mottled ground colour, edged above with paler and below with white, and the third of a similar width of dark gray-brown, edged above with black; the spiracular stripe is broader and of nearly equal width, of pale ochreous-brown, edged both above and below with brownish white. The spiracles are black, the belly and legs drab colour. The head is brown, on which the principal stripes of the body are delicately marked with darker brown."—*Buckler.*

TIME OF APPEARANCE.—Caterpillar in autumn, winter, and spring (after hybernation); chrysalis in June; and the butterfly in June and July.

LOCALITIES.—Common in stony, rocky,

heathy, uncultivated places, and on elevated poor pastures; often concealing itself on the ground, and flying only when disturbed, and then for a short distance. I never saw it settling on flowers or basking in sunshine: Mr. Doubleday, however, says he saw scores on the wing together in the Island of Sark on the side of a rock upon which the sun shone early in the morning. Mr. Birchall says it is generally abundant throughout Ireland, and that he took it at Douglas in the Isle of Man. Dr. Buchanan White says that "although rather local in Perthshire, it is an abundant species where it does occur. Its favourite haunts are warm rocks, such as Kinnoull and Moncrieffe hills, and in such situations it is very common. In Scotland it occurs as far north as Sutherland, but does not seem to be found in the alpine parts of the country. Scottish specimens are slightly larger and darker than English ones." Dr. White gives the following dates of capture:—"1858, June 21; 1860, July 16; 1864, June 25; 1865, July 1." In England it occurs in nearly all our counties, and often abundantly.



26.—Meadow Brown (*Epinephele Janira*). Upper side of Male.



Upper side of Female.

26. Meadow Brown.—The tips of the wings are blunt, and the hind margin of the hind wings is decidedly scalloped, that of the fore wings indistinctly so; the colour of the fore wings is smoky brown, with a large transverse blotch, almost amounting to the central area, inclining to rusty brown, or in some specimens to wainscot brown; within this paler blotch is a large circular white-pupilled black spot; the hind wings are almost uniform smoky brown, with a slightly paler



Under side of Female.

transverse median mark. Such is a description of the upper side of the female; the male is very much darker, and nearly uniform umber-brown; the pale blotch and black spot are to be traced, but are very indistinct. The under side is paler; the basal half of the fore wings is deep fulvous, followed by a pale fulvous band, in which is a large circular white-pupilled black spot; the hind margin is umber-brown; the hind wings are brown; the basal and hind-marginal area are darker; a transverse band across the middle is paler: the outer margin of this pale band is not clearly defined.



Variety of Male in Mr. Bond's collection.

Varieties.—This species is exceedingly subject to variation in one particular manner, namely, in the presence of large blotches or sometimes of an entire wing, having the

appearance of being bleached, the usual brown colour being absent in such blotches, and a kind of dingy white appearing in its place;



Variety of Female in Mr. Clark's collection.

two of these curious aberrations are figured. The female also occasionally appears with all the coloration of the male. Mr. Dale first called my attention to this peculiarity, and forwarded me a specimen; since which I have captured several.

Obs.—The male is the *Papilio Janira* of Linnæus; the female is that author's *Papilio Jurtina.*

Life History.—The females deposit their eggs on various species of grasses, and, from the willingness exhibited by the caterpillars in confinement to eat any grasses provided for them, I conclude that little choice is displayed in the selection of species: the period of oviposition extends over seven or eight weeks, commencing about the third week in June, and ending about the middle of August, during the whole of which period I have observed the females busily engaged in this occupation. The young caterpillar emerges in twelve days, and feeds sparingly, after the manner of infant caterpillars, until the first moult; as soon as this is accomplished it retires towards the surface of the ground, and hybernates at the roots of the herbage. In May it reappears, and may then be found by examining the mowing grass near the surface of the ground. It is usually full fed by the beginning of June, and then rests in a tolerably straight position, generally towards the base of a blade of grass, but when disturbed falls from its food-plant, and rolls itself in a tight, but not very compact, ring, the anal extremity protruding in rather a marked manner over the head: in this attitude it will remain for hours perfectly motionless. The head is rather broader than the second segment, and its position prone: the body is obese, somewhat spindle-shaped, tapering from the sixth to the thirteenth segment, which terminates in two parallel points above the anal aperture and directed backwards; the surface of the skin is rough, almost like shagreen, the roughness being caused by minute warts; the segmental divisions are not well marked, except when the caterpillar is rolled up; each segment is transversely divided into sections, which are also obscurely indicated; the sides are slightly dilated; the surface throughout is pretty thickly covered with arched hairs directed backwards. The colour of the head and body is opaque apple-green, with a medio-dorsal darker stripe, indicating the position of the alimentary canal, and probably partially due to the presence of food therein: the lateral dilatation is surmounted with a narrow pale stripe, almost white; the anal points are dirty white, tinged with brown; the hairs are white. Three of my specimens changed to chrysalids on the 18th, 24th and 29th of May respectively: the head of the chrysalis is obtusely eared, the ears very distant and short; the thorax is dorsally keeled, the keel being slender and entire; the shoulders of the wing-cases are produced into an obtuse tooth: in two instances the skin of the caterpillar remained, enveloping the anal extremity, so that the chrysalis could not be suspended; in the third it hung for a time from a blade of grass, the skin still enveloping the anal extremity, but attached by its anal hooks to silken threads on the grass. The colour of the chrysalis is pale apple-green, freckled with whitish or yellowish green, and adorned with purple-black markings, of which the more conspicuous are—first, two dorsal series, commencing behind the head, passing on each side of the thoracic keel, broken into spots on the fourth, seventh, eighth and ninth segments, and continuous on the remainder; secondly, a series passing over the ears, and

occupying the dorsal margin of the wing-cases; thirdly, an angulated longitudinal stripe on the wing-cases, dividing them into two nearly equal parts; fourthly, a shorter stripe nearer the tip of the wing-cases; and fifthly, the cases of the fore and middle legs. *Newman.*

Time of Appearance.—The caterpillar lives throughout the autumn, winter, and spring; the butterfly is on the wing during the hay harvest.

Localities.—This is perhaps the most generally abundant of all our butterflies, frequenting every meadow when the grass is ready for cutting. Mr. Birchall says it is generally abundant throughout Ireland, and that it occurs in the Isle of Man. Dr. Buchanan White says it is a common species in Scotland, although it was rare in the Rannoch district in 1867. Its range does not extend high up the mountains. It swarms in most parts of Wales, and I have seen no English district in which it does not abound.



27.—The Large Heath (*Epinephele Tithonus*). Upper side of Male.



Upper side of Female and Under side of Male.

27. The Large Heath.—The hind margin of the hind wings is scalloped, that of the fore wings is simple; the colour of the fore wings on the upper side is bright rust-colour, approaching to fulvous, with a broad hind-marginal band of umber-brown; the costal margin is also suffused with brown; near the apical angle of the median rust-coloured area is a conspicuous circular black spot with two white pupils; the hind wings are umber-brown, with a restricted rust-coloured patch in the centre. The under side of the fore wings is reddish fulvous, with a broad brown hind-marginal border; the hind wings are marbled with gray-brown, the basal area and a portion of the hind-marginal area being darker; the intervening space is paler or grayish brown, and tinged with ochreous; it contains four darker spots, each of which has a white pupil. Such is a description of the female; the male differs on the upper side in having a transverse brown band originating rather above the middle of the wing, and descending obliquely to the middle of the hind margin.

Varieties—Some few specimens have on the upper side one or two additional smaller black spots near the hind margin of the fore wings; these are very rarely white-pupilled.

Life History.—The eggs are laid during July on the blades of grass, and may be described as truncated cones; they stand erect, the base being broader than the apex; they have sixteen, seventeen, or eighteen perpendicular ribs, and a great number of extremely delicate transverse striæ, only visible under a lens of high power; their colour at first is canary-yellow, but in a few days they acquire a browner hue, and before the emergence of the caterpillar they exhibit a darker median band. The young caterpillars emerge during August, generally between the 5th and 25th of the month, and at first eat very little and grow very slowly; they moult twice before the winter, and hybernate at the roots of grasses while still very small; in May they reascend the grass and feed voraciously, and are full-grown by midsummer. The caterpillar, when full-grown, rests in a perfectly straight position on a blade or stalk of

the food-plant, which is the common couch grass (*Triticum repens*), a favourite food of the genus; but when annoyed it falls to the ground, assuming a crescentic posture; the head is subglobose, exserted, manifestly wider than the second segment, thickly covered with scabrous points, each of which emits a minute bristle; the body is somewhat shuttle-shaped, the diminution towards the head being rather less than towards the anal extremity; the divisions of the segments are clearly defined, and each segment is transversely wrinkled or divided into sections, which are usually, but not invariably, six in number; each of these sections is beset with scabrous points, and each point emits a short and slender, but stiff bristle; the thirteenth segment terminates in two scabrous conical points parallel to each other, and directed backwards; the colour of the head is pale pinkish brown; of the body either glaucous green or olive green, or, in some specimens, pale dingy brown; in either case it has five nearly equidistant longitudinal stripes; a narrow and dark medio-dorsal stripe extends from behind the head to the sinus between the caudal points; on each side, half-way between this and the spiracles, is a pale stripe, bordered above with a dark ground colour, which makes it appear more conspicuous; and below this, on a line with the spiracles, is a more distinct and whiter stripe; this also is bordered above with a dark ground colour; the feet and claspers are concolorous with the body. When about to change, the caterpillar attaches itself by the anal claspers to a blade of grass, and in two days is transformed into a CHRYSALIS, suspended by minute anal hooks from a delicate silken carpeting, with which the caterpillar had previously and designedly covered a small space on the grass. The chrysalis is short and obese; its head is dilated, and flattened in front, the flattened portion being produced on the sides into obtuse ears, with a slightly-hollowed space between them; the thorax has a sharp medio-dorsal keel; the body is dorsally somewhat verrucose, having four longitudinal dorsal series of extremely depressed and scarcely perceptible warts; the colour is almost white, sometimes slightly tinged with green, and ornamented with numerous black markings, of which the undermentioned are the most conspicuous: a narrow dorsal line on the thorax, divided just behind the head, and again united; two dorsal stripes commencing very near the back of the head, passing on each side of the thoracic dorsal line, then dilating and broken up into subquadrate and rather paler blotches; on each side exterior to these is another somewhat similar marking, commencing on the thorax as a stripe, but interrupted and vague towards the anal extremity; and again, exterior to this is a broad black linear patch adjoining the wing-cases; the wing-cases are dashed with black longitudinally; the cases of the antennæ are most delicately marked with black, each joint having two round black dots; the cases of the middle and hind legs are almost entirely black. The last skin of the caterpillar is not shed, but, being gradually pushed downwards by a wriggling movement of the chrysalis during its metamorphosis, encompasses the anal segment only, and remains in this position even after the butterfly has made its escape.—*Newman.*

TIME OF APPEARANCE.—The caterpillar may be found by sweeping the grass on hedge banks in June, and the CHRYSALIS at the end of the same month; the butterfly is on the wing during the whole of July. I have never seen the slightest indication of a second brood.

LOCALITIES.—Mr. Birchall says it occurs in the Irish county of Wicklow and near Cork, thus implying that its distribution is not general in Ireland. It has not been observed in the Isle of Man. Dr. Buchanan White does not mention it as occurring in Scotland; but at p. 17 of the fourth volume of the "Entomologist," Mr. W. D. Robinson informs us that he has met with it commonly in Kircudbrightshire.

In the following English counties it is reported to be common:—Bedford, Berks, Bucks, Cambridge, Cornwall, Devon, Gloucester, Durham, Essex, Hants, Hereford, Hertford, Huntingdon, Kent, Middlesex, Monmouth, Somerset, Stafford, Suffolk, Surrey, Sussex, Wilts, and Worcester.

In the following English counties its occurrence is recorded without note of abundance or rarity:—Cheshire, Lancashire, Norfolk, Northampton, Northumberland, Warwick, and York.

From Derbyshire, Lincolnshire, Nottinghamshire, Oxfordshire, Shropshire, and Westmoreland I have no records of its occurrence, although the lists from some of these counties are remarkably complete.



28.—The Ringlet (*Epinephele Hyperanthus*). Upper side.



Under side.

28. The Ringlet.—The hind margin of the fore wings is rounded, that of the hind wings slightly scalloped; the colour of all the wings is dark sepia-brown or smoky black, with an indication, and nothing more, of the ocellated spots I am about to describe as present on the under side. The under side is uniform umber-brown, sprinkled with fulvous scales sufficiently numerous to tinge the whole under surface slightly with fulvous. There is a series of eight circular spots parallel with the hind margin; three of these are on the fore wings and five on the hind wings; the two spots on the hind wings which most nearly approach the fore wings stand rather farther from the hind margin than the other three, and are generally united; all these spots are black, with a white pupil and a very pale circumscription.



Six Varieties of the Under side in Mr. Bond's collection.

Varieties.—The white-pupilled spots on the under side are liable to great variation in intensity and magnitude; in some specimens they are dwindled to mere points, and from others they are entirely absent. The beautiful series of six under sides figured on the preceding page is in the cabinet of Mr. Bond, and has been most kindly lent purposely for this work. It is extremely interesting, as showing how a character, supposed to be of specific value, can be modified, and indeed entirely lost, without inducing the slightest doubt as to the propriety of uniting all these dissimilar individuals under one specific name.

Life History.—The egg is laid singly, in July and August, on several species of grass, of which the common millet grass (*Milium effusum*), the turfy hair grass (*Aira cæspitosa*), and the annual meadow grass (*Poa annua*), have been more particularly observed, but the common couch grass (*Triticum repens*) is the species which the caterpillar described below selected, by preference, for food in confinement. The caterpillar attains but a small size during the autumn, and hybernates at the roots of the various grasses on which it feeds, but crawls out and begins feeding again very early in the year, and by the end of March is often half-grown; it feeds during the night, and cannot readily be found, unless diligent search be made with a lanthorn among the long grasses so commonly growing along our hedgerows and ditches, more especially in the neighbourhood of woods. The individual specimen which I have described was full fed on the 4th of July: it then rested in a straight position, was very quiescent, and indeed exhibited a great reluctance to motion of any kind: when disturbed it fell off its food-plant, feigning death, and assuming a crescentic form, but the two extremities never touched; in this form it secretes itself at the roots of grasses, and does not reascend until the apprehended danger has passed. The head is exserted, and is wider than the second segment, and covered with minute bristle-bearing warts, which make it rough and scabrous; the body is fusiform, the sides dilated, and the dilatation fringed with strong bristles; the anal extremity terminates in two points, directed backwards; the dorsal surface is wrinkled transversely, each segment being thus distinctly divided into sections. The colour of the head is pale wainscot-brown, each cheek having three slightly darker but faint broad stripes; the ocelli are crowded together on each side of the mouth, and intensely black; the body is very pale wainscot-brown, with a medio-dorsal darker stripe, in which are still darker and obscurely quadrate spots at the interstices of the segments; from the tenth segment to the thirteenth, both inclusive, the medio-dorsal stripe is continuously of the darker brown; the lateral dilated skinfold is almost white; the spiracles are intensely black; the rest of the dorsal surface is marked with very irregular brown lines. Towards the end of June it attaches itself by the anal claspers, and, hanging with its head downwards, is transformed into a short and very obese chrysalis, the head of which is rounded and undivided; the anal extremity, that is, the thirteenth segment only, is very attenuated and flattened, the extreme tip still narrower, slightly incurved, and terminating in a row of minute hooks, by means of which it adheres to a slight web which the caterpillar had previously spun, and from which it had suspended itself. The colour of the chrysalis is pale wainscot-brown, with a semitransparent appearance in the wing-cases, which, as well as the antennæ, are delicately clouded and reticulated with darker brown; the dorsal surface is also delicately dotted with brown, as well as having larger spots methodically arranged; a pair of these, transversely elongate, but arranged longitudinally, form an almost medio-dorsal series on each side of each segment.—*Newman.*

Time of Appearance.—The caterpillar is full fed about the beginning of June; the chrysalis is usually found towards the end of the month; and the butterfly continues on the wing throughout July. There is only one brood.

Localities.—Widely distributed. Mr. Birchall says that in Ireland it is rather local:

he observed it in profusion near Galway and in Malahide Park. It has not yet been observed in the Isle of Man. In Scotland it also occurs. Dr. Buchanan White says it is a local species in Perthshire, and he believes it is only found in the lowland part of the county. It occurs on Kinnoul Hill in Glenfarg. Skye is the most northern locality in Scotland at present known for the species. In England it is common, but local. Mr. Naish found it flying in incredible numbers in the woods adjoining Weston-super-Mare, and I have seen it in like profusion in many places.

Obs.—I have thought it desirable to write two descriptions of the butterfly which follows next in succession; thus not only differentiating the two forms, but leaving the reader at liberty to consider them "races," "varieties," or "species," according to his own judgment.



29.—Marsh Ringlet (*Cœnonympha Davus*). Two Upper sides and two Under sides.

29. The Marsh Ringlet.—The wings are rounded, and their hind margin is simple: the colour of the upper side is pale dingy fulvous in the females, darker in the males; a straight transverse pale mark crosses the middle of the fore wings in the females, and between this and the hind margin are two circular pale spots distant from each other and nearly equidistant from the hind margin; these spots have a black centre, but they are always indistinct, and sometimes altogether absent: the hind wings are rather darker than the fore wings, especially about the base and hind margin, but there is a pale blotch of uncertain shape extending from the centre of the wing to the costal margin, and there are traces of a series of circular spots parallel with the hind margin. The under side of the fore wings is partially divided by a straight pale bar, or a portion thereof, crossing the middle of the wing, but sometimes the upper portion of the bar alone is perceptible; the basal area within this bar is fulvous brown tinged with rust-colour, which colour also extends along the inner margin to the anal angle; the apical angle is brownish gray, and generally contains a pale circular spot with a black centre; the hind wings are brown and clothed with fulvous hairs; an irregular pale bar crosses the middle of the wing, and this is invariably broken or interrupted in the middle; intermediate between this bar and the hind margin is frequently a series of six circular spots, which are black with white pupils and a pale circumscription; these are always indistinct, often reduced to mere points, and sometimes entirely absent; and the hind wings, being covered with rather long glossy hairs or hair-like scales, have a somewhat shaggy appearance.

Obs.—This insect is certainly the Typhon of Haworth, but as certainly the Davus of Fabricius, whose earlier name must be adopted.

Life History.—The life history of this insect is unknown, unless, indeed, it may be supposed identical with that of the following.

Time of Appearance.—From the second week in June to the end of July.

Localities.—Generally spoken of as a

northern insect, but the term is scarcely precise. It occurs abundantly in the extreme south of Ireland; Mr. Birchall informs me that this insect is especially common in the counties Galway, Mayo, and Kerry. The Honourable Miss Lawless says it is extremely abundant in the bogs of Connemara. Mrs. Battersby has taken very fine specimens in the Cromlyn bogs about Rathowen; and I have myself had the pleasure of taking it in the county Donegal. It has not been observed in the Isle of Man. In Scotland it is far from uncommon. Mr. Young, of Paisley, writing in the "Entomologists' Weekly Intelligencer," on the 29th June, 1857, says that Davus has made its appearance on the heaths and mosses in the vicinity of Paisley, and is unusually abundant. Dr. Buchanan White says that "it is not so widely distributed in Perthshire as might have been expected. There are many suitable localities near Perth where it ought to occur, but as yet it has not been detected in them: it is common at Rannoch and in other Highland districts, and is found at a considerable elevation: it appears to be abundant throughout Scotland." Dr. White adds that it occurs on the Scotch mountains at an elevation of upwards of two thousand feet.

Orkney. I have a pair of Davus from Orkney almost white—*Henry Doubleday.*

Shetland. Several specimens have been taken in Shetland; and one of these, obligingly lent me by Mr. Birchall, is figured. It is the third in the series.

Rothlieb's Marsh Ringlet.—The wings are rounded, and their hind margins simple: the colour of the upper side is dull fawn-colour, darker towards the margins; and the hind wings, especially towards the base, are darker than the fore wings; on the fore wings are two, and on the hind wings four, obscure circular smoky brown spots, each having a pale circumscription; in many specimens an additional spot is visible on the costal margin; these spots form an irregular series parallel with the hind margin, and have a semitransparent appearance; in fact, their presence may be due, in a good degree, to the thin and semitransparent character of the wing, which admits of the corresponding spots



Rothlieb's Marsh Ringlet (*Cœnonympha Davus*, var *Rothliebii*). One Upper side, five Under sides.

on the under side being seen through. The under side of the fore wings is divided by a straight pale bar which crosses the wing a little beyond the middle into two distinct areas; the basal area is fulvous-brown, tinged with rust-

colour; the hind-marginal area is duller, and contains a series of circular black spots half way between the transverse bar and the hind margin; these spots are generally four in number, three near the apical angle being closely approximate, almost contiguous; and the other, which is less distinct, being nearer the anal angle: the second of these spots, counting from the costa, has generally a white pupil, the others are generally without: the hind wings are dark brown at the base, thickly sprinkled with fulvous scales; beyond the brown basal area is a pale oblique band crossing the middle of the wing in a very irregular manner, and always interrupted near the middle; the hind-marginal area beyond this band is divided by the wing-rays into seven compartments, each of which contains a circular black spot with a white pupil and pale circumscription; these seven spots form a semicircular series parallel with the hind margin; the seventh, situated at the anal angle, is often absent, and the sixth is often double; the others vary in intensity and magnitude, as shown in the figures, and are often very beautiful.

Obs. 1.—The underside has not that gray and shaggy appearance which I have described as characteristic of the typical Davus.

Obs. 2.—This insect is undoubtedly the Davus of Haworth, but not of Fabricius, who certainly applied that name to the preceding insect.

Obs. 3.—The ten very accurate figures engraved to illustrate this species have been kindly lent by Mr. Bond and Mr. Birchall.

Life History.—The egg is barrel-shaped, the sides convex and delicately ribbed; it is attached by the lower extremity to the linear setiform leaves of beak-rush (*Rhynchospora alba*), on which it is laid at the end of June, always singly, and generally only one on a leaf, but sometimes two, and very rarely three. The young caterpillars emerge in fifteen days, and crawling to the extremity begin feeding; they feed during the day, and grow very slowly; they rest on the leaves in a perfectly straight position, but on being annoyed fall from their food on the *Sphagnum* or other mosses among which the *Rhynchospora* usually grows, and there lie in a bent posture, as if dead, until all appearance of danger has passed, when they reascend the leaves: when among the moss it is almost impossible to detect them. At the end of August those under my care ceased to eat, and on the 1st of September I made the following description:—The head is semiglobose, wider than the body, slightly notched on the crown, and beset with minute hairs; the body is linear, its sides almost parallel, but slightly and gradually attenuated towards the anal extremity, which terminates in two points directed backwards; the dorsal surface is transversely and regularly wrinkled, and is covered with minute warts, which under a pocket lens give the surface the appearance of extremely fine shagreen; the dorsal wrinkles divide each segment into four sections, in addition to which there is a transverse skin-fold between the sections, and this has often the appearance of being double, so that each segment has the appearance of having five and sometimes six sections. The colour of the head is dingy semitransparent green; the ocelli are very prominent and intensely black; the colour of the body is dingy green, with five narrow, equidistant, distinct, purple-brown stripes; the interspace between the second and third stripe on each side is intersected by a very narrow and indistinct stripe, almost similar in colour to the other five, and the exterior purple stripe on each side is bordered below by a pale glaucous, almost white stripe, extending throughout its entire length. Immediately after this description was written the little caterpillars disappeared, probably secreting themselves at the roots of their food-plant. In the spring of 1865 I saw nothing more of these hybernating caterpillars, but received a fresh supply on the 26th of May, when they appeared full fed. The caterpillar then rests in a perfectly straight position on the blades of the beak-rush, falls off its food-plant when annoyed, and remains quiescent for some time, as if dead, in a somewhat bent position. At this date I made a second description:—The head

is rather wider than the second segment, distinctly exserted, prone and rough with minute warts; the body is cylindrical, and very gradually attenuated towards the anal extremity, which terminates in two parallel points above the anal flap, and directed backwards; the surface of the body is almost smooth; warts, indeed, are observable, but so minute as not to communicate a scabrous appearance, nor are there any noticeable hairs or bristles. The colour of the head and body is apple-green, inclining to olive-green; the head is dull, opaque, and uniformly coloured; the body is striped; there is a narrow mediodorsal stripe dark purple-green, bordered on each side by a still narrower yellow stripe; these three stripes terminate before the anal points; on each side are two pale yellow stripes, one above, the other below, the pale brown spiracles; the upper of these is bordered above and below with dark blueish green, and terminates in the anal flap, which is tinged with pink; the lower terminates before the anal flap; the ventral surface, legs, and claspers are bottle-green. Two days subsequently—namely, on the 28th of May—they underwent pupation. The CHRYSALIS has the head truncate and slightly produced at the angles and also in the middle; the wing-cases are very slightly produced at the shoulders; the thorax is dorsally convex, with a very slight median keel; the chrysalis is suspended by minute caudal hooks from a white silken web spun on the edge of a leaf of its food-plant; the colour of the wing-cases is pale brown, with a darker arcuate median linear mark extending from the base to the margin, and a much shorter mark of the same colour in front of this, originating in the disk, but also extending to the margin; the head, thorax, and abdomen are apple-green, sprinkled with dingy whitish green. The butterflies produced from the individuals described appeared on the wing on the 4th and 5th of June. I am indebted to Mr. Hudson, of Bawtry, for specimens of the egg, caterpillar, and chrysalis; for a supply of the food-plant; and for information respecting the economy of this species.—*Newman.*

Obs.—At page 35 of the first volume of the "Entomologists' Weekly Intelligencer," Mr. Joseph Chappell states that the caterpillar also feeds on the cotton grass, near the roots, in May.

TIME OF APPEARANCE.—End of June, July, and sometimes in August and September.

LOCALITIES.—It has never been found in Ireland, the Isle of Man, or Scotland. The English localities are as follow:—

Cheshire. In Delamere forest — *Noah Greening.*

Cumberland. On all the mosses in Cumberland, and I obtained a specimen last season, taken along with *Epiphron*, that almost looked like a new species, the black spots being as clear and bright as in *Tithonus*, and the spots were differently placed. I call it the Polydama variety—*J. B. Hodgkinson.*

Durham. This insect frequents our wet mossy bogs in July, and I have taken it also late in June and early in August. Needless Hall Moor, moors about Cambo, Prestwich Carr, Muckle Moor, near Hayden Bridge; moss near Craigclough, moors near Shull—*William Backhouse* in "Wailes' Catalogue."

Lancashire. Simmon's Wood Moss—*Edwin Birchall;* Chat Moss, near Manchester, 6th September, 1868—*Joseph Leigh* in "Entomologist," iv. 147.

Northumberland. Plentiful in Prestwich Carr before it was drained; I have not heard of any captures lately—*William Maling.*

Staffordshire. Chartley Park, near Uttoxeter—*Stainton's "Manual."*

Westmoreland. Abundant in the mosses at Witherslack in June and July—*J. B. Hodgkinson.*

Yorkshire. Thorne Moor, near Doncaster—*Alfred Ecroyd;* Hadfield Fens—*E. Birchall.* I took it at Thorne Moor, but wasted, and had specimens given me from Cottingham, near Hull. In visiting this latter locality, I find it differs from Thorne Moor, which is mossy or spongy; but the Cottingham locality is rather like those spots where I have taken Davus in Scotland—*J. C. Dale,* "Entomologist," 191.



30.—The Small Heath (*Cœnonympha Pamphilus*). Upper side.



Under side.

30. The Small Heath.—The wings are rounded; the hind margin of the fore wings is simple, of the hind wings waved; the colour of the upper side is pale delicate fulvous, the hind wings being slightly darker than the fore wings, and the hind margin of all the wings being also darker; near the apical angle of the fore wings is a circular brown spot. On the under side the fore wings have the disk fulvous, the tip ochreous, and the hind margin gray; the ochreous area at the tip contains a circular black spot with a white pupil and a pale ochreous circumscription, and again enclosing this is a second ring, rather darker, yet very indistinct; the hind wings have the basal area dark brown, their marginal area gray; the division between these areas is irregular, but very decidedly marked; the gray or marginal area has a median transverse darker cloud, in which the position of a series of ocellated spots is indistinctly indicated by mere dots.

Life History.—The eggs, which are oblong, with a truncated base by which they are attached, are laid on the leaves of the small mat-grass (*Nardus stricta*) and several other species of grass, in May and June; the caterpillar emerges in fourteen or fifteen days, and is full fed in about thirty days, or at the end of July; it then rests in a perfectly straight position, reposing on the stalk of the grass. The head is subglobose, and slightly broader than the second segment; the body is somewhat fusiform, gradually attenuated towards the anal extremity, where it terminates in two short points directed backwards: the dorsal surface of each segment is divided transversely into narrow sections, and these sections, being covered with minute scabrous points, give it the appearance of being finely shagreened; the colour of the head is opaque green, the mouth and ocelli almost black; the body is delicate apple-green, with a clearly defined and moderately wide medio-dorsal darker stripe, bordered on both sides by a narrow paler stripe; on each side, and including the spiracles, is a broader and less clearly defined dark green stripe, bordered towards the ventral surface by a narrow but very distinct bright yellow-green stripe; the spiracles are wainscot-brown, and each emits towards the head a faint nebulous paler line, reminding one of the tail of a comet; about equidistant from the dark medio-dorsal stripe and the yellow-green subspiracular stripe is a third stripe of two tints, its dorsal margin dark green, its ventral margin yellow-green; the anal points are pink; the legs are tinged with pink; the claspers are concolorous with the ventral surface. When full grown my specimen spun a little band of white silk round a stalk of the common knot-grass (*Polygonum aviculare*), and, suspending itself therefrom by the anal claspers, changed to an obese chrysalis, suspended by anal hooks; the head of the chrysalis is broadly truncate, the thorax dorsally rounded, the colour vivid apple-green, and delicately irrorated with white dots; the costa of the wing-cases is decorated with a double stripe, the outer portion of which is purple-brown, the inner white.—*Newman.*

Time of Appearance.—The caterpillar of this insect, as already described, is to be found full fed at the end of July, and the chrysalis immediately afterwards. I have taken the butterfly in every month from May to October, both inclusive, but have found it especially abundant in June.

Localities.—This common butterfly occurs on all our heaths and rough pastures. Mr.

Birchall says it is common everywhere in Ireland, and he also records it as an inhabitant of the Isle of Man. Dr. Buchanan White says it is a very common species in Scotland in open places, in woods, and on the moors. Its range extends far up the hill sides. Scotch specimens are larger and darker than English ones.

BUTTERFLIES WHICH HAVE GIRTED CHRYSALIDS (IN SCIENCE *SUCCINCTI*)

I HAVE now arrived at the second division of those butterflies which I have called "Exposers," from the fact of their chrysalids being exposed to the full influence of weather and light, as explained at page 18. The first subdivision of the Exposers is called SUSPENDED, because the chrysalis is suspended with the head downwards; this second subdivision is called GIRTED, because the body is supported by a silken girth or belt. This belt is sometimes, but not always, perfectly free, so that it could be moved backwards and forwards on the surface of the back. In several species it is fixed firmly in its place by the overlapping of the fifth dorsal segment or plate at the moment when the caterpillar casts its final skin. Prior to this event the belt may be seen to pass over the back, but after the change to a chrysalis has taken place it is no longer perceptible beyond the inner margin of the wing-case, where it appears as though entering the body by a minute aperture, and as passing through the body and again re-appearing at a corresponding aperture on the opposite side; in fact, the appearance is exactly the same as if the belt had been passed, by means of a needle, completely through the body, going in at one side and out at the other. The fabrication of the belt is a most interesting process: the caterpillar, clinging to a coverlet or network of silk spread over the surface of some perpendicular object, turns his head in one direction until it nearly touches the middle of his side; he then spins from his mouth a silken thread, attaching the end thereof to the silk already spread to receive it. Having made the thread fast at this spot, he may be said to carry it in his mouth over his back to a similar spot on the other side of his body, where he again makes it fast; and thus a first step is taken in the fabrication of the belt: the operation is repeated twenty, thirty, or even forty times, and an equal number of threads pass over his back. These silken threads, like those in each strand of a cable, unite in forming a single strand, and seem not only to be parallel, but to adhere to each other. I can detect no movement by which they are twisted together, but, nevertheless, they are united, and it is only when forcibly broken that the number of single threads becomes manifest. The required number of threads being produced, the caterpillar rests from his labour and waits the hour of transformation. The subdivision contains two Natural Orders.

Natural Order III.—WOODLOUSE-SHAPED (in science *Onisciformes*).

The distinguishing character of which is that the caterpillar is shaped like a woodlouse; its head is very small, and completely retractile within the second segment; the legs and claspers are also concealed by the dilated sides of the caterpillar. The chrysalis is obese and generally rounded; it is attached by the tail as well as supported by the silken band or belt already described. The British butterflies contained in this order are generally divided into two families, distinguished by the perfection or imperfection of the fore legs in the male.

Family 7.—DRYADS (in science *Erycinidæ*).

The only notable distinction between this and the following family is in the perfect insect, the males of which, in the *Erycinidæ* have only four perfect legs, while the females have six.

31. DUKE OF BURGUNDY.—The fore wings have the costal margin very nearly straight, the tip blunt, but not rounded, and the hind

margin simple; the hind wings have the hind margin scalloped and the anal angle slightly produced. The colour of the fore wings is dark brown, with three irregular transverse bands of bright fulvous spots; the first band, nearest the base, is composed of four such spots; the second, crossing the middle of the



31. Duke of Burgundy (*Nemeobius Lucina*). Upper side.



Under side.

wing, has six such spots, that nearest the costal margin being much smaller than the rest, and being accompanied by a linear ochreous spot still nearer the margin; the fourth spot in this band, counting from the costal margin, is out of the regular series, and more distant from the base of the wing; the third band is almost marginal, and is composed of six spots, of which that nearest the costal margin is smaller than the rest, and is accompanied by a linear ochreous spot still nearer the costal margin; the other spots composing this third band have a median black spot: the hind wings are umber-brown, with five or six longish fulvous spots about the middle, and a hind-marginal series of five or six fulvous spots, each of which has a median black spot. The fringe of all the wings is spotted, pure white and dark brown alternating regularly. The under side of the fore wings is beautifully tesselated with black and different shades of brown; the under side of the hind wings is bright rust-colour, with two transverse bands of very pale yellow or pure white spots. These are clearly defined and very beautiful; the first, near the base, is composed of five spots; the second, near the middle of the wing, is composed of nine spots. There is also a marginal series of six wedge-shaped black spots, each of which stands on a yellow spot, and points towards the base of the wing.

Life History.—The eggs are laid about the 1st of June (I give this as a medium date, having no doubt that the period of oviposition may extend over twenty days), on the under side of the leaves of the cowslip (*Primula veris*) or primrose (*Primula acaulis*), either singly or in clusters of four or five; their shape is spheroid, depressed at the south pole or base, and produced at the north pole or apex; their colour is pale glaucous. The caterpillar emerges about the fourteenth day, and remains on the under side of the leaf, in which it makes small round holes, thereby indicating its presence; it continues to feed for several weeks, the duration of the caterpillar state being dependent on temperature. When full-fed, it rests with its under surface closely appressed to the leaf; but if touched or annoyed it falls from its food-plant, lying motionless on its side, and bending its body in a crescentic form, the two extremities approaching, but not meeting. The head is narrower and every way smaller than the second segment, into which it is received and sometimes completely withdrawn; the body is somewhat woodlouse-shaped, the dorsal surface being convex, and the ventral surface flat; the legs and claspers are concealed; the divisions of the segments are deeply incised and well-defined; each segment emits about forty hairs or bristles, of which those on the back are slightly arched, those on the sides straight. The colour of the head is pale wainscot-brown; it is shining and hairy, the hairs and ocelli are black; the colour of the body is dingy white, with an indistinct mediodorsal stripe of a smoky olive tint, apparently in great measure due to the presence of food in the alimentary canal, an inference that receives support from the fact of the stripe being partially interrupted at the segments; on each side is a waved olive stripe, also interrupted at the segments, and thus divided into a number of short oblique lines, each of which

terminates in a yellowish dot; on each segment, between the medio-dorsal and lateral stripes, is an orange-coloured, wart-like and hairy spot; there is a second indistinct lateral stripe near the spiracles, which is olive-green at its anterior extremity, but fades into yellow towards the anal extremity; the spiracles are black; the ventral surface is pale olive-green. The CHRYSALIS is obese, and its head rounded; it is attached by the tail, and also by a belt round the waist, to the leaf or petiole of the food-plant; all parts of the body emit longish hairs, in the same manner as the caterpillar: the colour is the most delicate pale wainscot-brown, with a number of black spots; the principal of these are—a narrow band passing over the neck immediately behind the base of the antenna-case; a shorter band behind this, but in front of the thorax; a short stripe on the costa of each wing case, and numerous subquadrate spots spread over the entire dorsal surface; these are disposed in two dorsal series of eleven each, and two lateral series on each side; these spots are irregular and minute on the thorax, but regular and conspicuous on the abdomen, where is also a third intervening series of minute dots; all the hairs are sienna-brown. It remains in the chrysalis state throughout the winter.—*Newman.*

TIME OF APPEARANCE.—Caterpillar on the under side of cowslip and primrose leaves in June, July, and August; the chrysalis during the winter, and the butterfly in June.

Obs.—At page 44 of the third volume of the "Entomologist," Mr. Wright announces that he bred two specimens on the 8th February; and at page 204 of the same volume the Rev. H. Harpur Crewe records that he reared a second brood of *Lucina* in 1865. He says the larvæ grew up and assumed the chrysalis state very rapidly, and he left them, supposing they would remain in that state until the following summer; but on looking into the cage in October, he found the perfect insects had emerged, and were dead and dry.

LOCALITIES.—Always in woods, flying along the roads and pathways with a giddy zig-zag flight, and occasionally settling on twigs six or eight feet from the ground; apparently fonder of leaves than flowers, on which it seems rarely to feed. I doubt its occurrence in Ireland, notwithstanding the following note from the pen of Mr. Birchall:—

"In Mr. Tardy's collection, now incorporated with that of Trinity College, Dublin, there are specimens of this insect, but I am unable to say where captured, most probably in the county Wicklow, a county he searched assiduously for many years. I have not met with the insect."—*Edwin Birchall.*

With such diligent and energetic resident entomologists as Mrs. Battersby, the Hon. Miss Lawless, and Mr. Fetherstonhaugh, it cannot long remain unknown if it be really a native of the Emerald Isle. It has not been found in Scotland or the Isle of Man. In England it has a wide, but what may be called a capricious range, as the subjoined localities will show.

Bedfordshire. Clapham Park Woods—*Stainton's "Manual."*

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Drayton Beauchamp, Aston Clinton, Buckland, Claydon—*H. H. Crewe;* Halton—*Joseph Greene.*

Cumberland. Not rare—*J. B. Hodgkinson.*

Derbyshire. Via Gallia, near Cromford—*H. H. Crewe.*

Devonshire. Rare; not in the Plymouth district, and not known to occur farther west than Dartmouth; Dunsford Wood, near Dartmouth—*J. J. Reading.*

Dorsetshire. Glanville's Wootton, Middlemarch Woods, Cranbourne Chace, rare of late years—*J. C. Dale.*

Essex. St. Osyth—*W. H. Harwood.*

Gloucestershire. Wootton-under-Edge; in the open parts of our woods very local, but generally abundant where found—*V. R. Perkins;* Painswick, Daneway Common, Sapperton—*M. G. Musgrave;* Guiting—*Joseph Greene;* common at Dursley—*Evan John.*

Hampshire. Near Brockenhurst—*F. Bond;* in the New Forest, but not common—*G. B. Corbyn;* Crabbe Wood, near Winchester, tolerably abundant—*G. H. Raynor.*

Herefordshire. At Hunters' Gate, Oakley Park—*F. E. Harman;* Briarly Wood, near Leominster—*E. Newman.*

Hertfordshire. Berkhampstead, common—*G. H. Raynor.*

Huntingdonshire. Monk's Wood — *F. Bond.*

Kent. Birch Wood, Joynson's Wood, Darenth Wood, wood at Chislehurst, West Wood on Shooter's Hill towards Welling—*E. Newman;* common on the borders of woods, abundant at Faversham — *H. A. Stowell;* Collyer's Wood—*W. Machin;* woods generally north and south of Barham Downs— *W. Oxenden Hammond.*

Lancashire. Not rare in North Lancashire, Grange, &c.—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire—*T. H. Allis.*

Northamptonshire. Barnwell Wold, the Lynches, near Peterborough — *Frederick Bond;* near Towcester—*Hamlet Clark.*

Oxfordshire. Stowe and Bagley Woods and Wychwood Forest—*W. H. Draper.*

Somersetshire. Weston-super-Mare—*A. E. Hudd.*

Suffolk. Near Stowmarket—*H. H. Crew;* Brandeston and Playford—*Joseph Greene.*

Surrey. Haslemere: This species occurs here in an extensive copse intersected with deep valleys: it frequents the bottoms of these valleys, where it flits about over the underwood, almost always returning to one particular spray; indeed, certain bushes, and even twigs, seem to be especially to their taste, since if one be taken another soon occupies its place. In this way one alder bush afforded me two or three specimens; and a little oak bush, in a particular warm and pleasant corner, was always sure to have a fresh tenant in a few hours, or, at any rate, in a day or two after the previous occupant had been captured. Occasionally, though rarely, a specimen would settle on a spurge bloom, the only flower they appeared to affect.—*C. G. Barrett,* in "*Entomologists' Monthly Magazine,*" No. 29.

Sussex. Watergate Hanger — *William Buckler;* Frenchlands Wood—*J. H. White.*

Westmoreland. Witherslack, not rare—*J. B. Hodgkinson.*

Wight, Isle of, Near Ryde—*F. Bond;* Parkhurst, Quarr Copse, Whiteford Wood—*Alfred Owen;* in woods, but not common—*James Pristo.*

Wiltshire. Manton and Rabley coppices, West Woods—*T. A. Preston.*

Worcestershire. Taken sparingly about two miles from Great Malvern—*W. Edwards.*

Yorkshire. Abundant near Pickering in 1868—*J. H. Rowntree;* Scarborough, Sheffield, York, Leeds—*Edwin Birchall;* Doncaster—*A'fred Ecroyd.*

Family 8.—Argus Butterflies (in science *Lycænidæ*).

In the general characters of their caterpillars and chrysalids they closely resemble the *Erycinidæ*, but in the perfect state they differ in having all the six legs perfectly formed for walking in both sexes. They are further divided, both by English entomologists and by technical authors, into Hairstreaks (in science *Thecla*), Coppers (in science *Polyommatus*), and Blues (in science *Lampides* and *Lycæna*).



32.—Green Hairstreak (*Thecla Rubi*). Upper side.



Under side.

32. Green Hairstreak.—The costal margin of the fore wings is nearly straight, the tip blunt, and the hind margin simple; the hind margin of the hind wings is scalloped, the point nearest the apical angle being slightly produced. The colour of the upper side is dark brown, exhibiting metallic reflections in a strong light; near the base of the wings are

numerous scattered scales of a metallic blue lustre; the costal margin is narrowly edged with bright rust-colour: the hind wings have a still more slender line of the same colour, followed by a black line, and this again by a white fringe. The under side is green, the costal and hind margin of the fore wings being narrowly edged with rust-colour, and the inner margin broadly streaked with brown; the hind margin of the hind wings is narrowly edged with rust-colour just within the fringe, which is alternately dark brown and snowy white. A transverse series of differently shaped white spots crosses all the wings about the middle, but their presence, as well as their size and shape, seems very uncertain; in some specimens the series is tolerably consecutive across all the wings, and every gradation may be found between such a consecutive series and a solitary white spot on the costal margin of the hind wings.

Life History.—In Hubner's figures of European caterpillars there are three representations of the caterpillar of the Green Hairstreak: one of them is represented on the sun cistus, and the other two on what appears to be a species of heath, or, perhaps, the crow berry; in all these figures the head is represented as very small and black, the body as woodlouse-shaped and green, with a mediodorsal and two lateral yellow stripes; it also has a lateral series of eight or nine oblique yellow lines. The chrysalis is very obese, dark brown, and hairy, with a distinct belt round the waist, and apparently an attachment at the anal extremity.—*Hubner's figures.*

Obs.—Lewin says:—"The caterpillars of this small fly feed on the buds and blossoms of the bramble, and when young artfully conceal themselves in the bud. They are at their full growth the beginning of July. They then retire to a convenient place for the security of the chrysalis, and fasten themselves with a slender thread round the middle and by the tail: thus secured, they change to chrysalids. The butterfly comes forth the first week in the following May." Lewin has figured the caterpillar of a pale green, with a brown dorsal stripe, and oblique white stripes on the sides.

Obs. 2.—Mr. Doubleday observes: "There is something curious about the caterpillar of the Green Hairstreak. I think Guenée says, in his volume on the "European Butterflies," that he has found this caterpillar, on Broom and *Genista*, and I believe it has been found here at Epping on these plants."

Time of Appearance.—The butterfly is on the wing in May and June.

Localities.—Mr. Birchall says it is common in Ireland, in the counties Dublin, Wicklow, and Kerry, and the Honourable Miss Lawless informs me that it is very abundant in the same localities as the Marsh Ringlet: that is, on the bogs and hills of Connemara and Mayo but not extending so high on the hills; it occurs in May and the beginning of June. Mrs. Battersby says it is frequent on moors, and Mr. Marsden says he has taken it in Galway. It has not been taken in the Isle of Man; but in Scotland it is not uncommon. Dr. Buchanan White says "that although apt to be overlooked, it is widely distributed in Perthshire, occurring in several places near Perth, as well as at Rannock. I have taken it in Inverness-shire, north of which it does not seem to have been observed: it appears to be single-brooded in Scotland." Dr. White gives the following dates:—"1858, May 20; 1863, May 30; 1867, June 28; 1868, May 9; 1869, May 1." In England it occurs in nearly all the county lists I have received, and when absent its absence may be supposed to arise from the want of observation.



33. Purple Hairstreak (*Thecla Quercus*). Upper side of Female.

33. Purple Hairstreak. The costal margin of the fore wings is almost straight, and the tip rather pointed, especially in the males; the hind margin is slightly waved: the hind wings are slightly scalloped, and the last

point before the anal angle is slightly produced. On the upper side all the wings are brownish black; every part in the males, except the margins, has a purple reflection; in the females this purple reflection is confined to a patch occupying a portion only of the fore wings, all the margins and the apical area of the wing being destitute of the purple



Under side.

colour. The underside is delicate gray, inclining to drab, with a transverse white line on all the wings; that on the fore wings is very straight, but imperfect, not reaching the inner margin; in the hind wings the first costal half only is straight, the inner-marginal half is twice bent, and assumes somewhat the form of the letter W; there is a bright orange spot at the anal angle of the hind wings, and a circular black-pupilled orange spot near the anal angle and also near the hind margin: the space between the white line and the hind margin contains a double series of pale smoke-coloured markings.

Life History.—The egg is laid on the twigs of the oak (*Quercus robur*) in July, and remains in that state during the winter, hatching in the spring, and the young caterpillar feeding on the oak-leaves; the caterpillar is full grown in June, and then closely resembles that familiar shell, the *Chiton*, and rests appressed to the surface of the leaf, just as the *Chiton* to the surface of rock; the head is small and retractile: the incisions between the segments of the body are very distinctly marked, the posterior edge of one segment slightly overlapping the anterior margin of the next following segment; the back is very convex, and is intersected by a medio-dorsal groove, which is narrow and distinct on the middle segments, but becomes vague and wide towards both extremities; the lateral margin of all the segments is thin and dilated, and every part of the body is clothed with fine scattered hairs, which become conspicuous when the caterpillar is viewed in profile: the colour is dull brownish green, sometimes tinged with pink, and there is a medio-dorsal series of pinkish arrow-heads, the two moieties of which are separated near the head. In captivity this caterpillar spins no cocoon, nor does it fasten itself by any belt or anal hooks as is the manner of its tribe, but retires just below the surface of the earth, and then turns to an obese unangled brown chrysalis, which emits minute hairs from the entire surface of its body—*Newman.*

Obs.—At p. 312 of the second volume of the "Entomologist," Mr. S. A. Davis writes thus: "Whilst collecting in July at West Wickham, I shook a small sapling ash, and observed several specimens of Thecla Quercus fly from it, and almost immediately return and settle again on the leaves, in most instances upon the same identical leaf from which they had been disturbed. Further observations proved this to be the case with most of the young ash-trees in the wood, and I could have captured dozens had I been so disposed. The same day I observed about twenty specimens gambolling and settling upon an ash tree near Beckenham, no oak being near." This seems to suggest the idea that the food of the caterpillar is not confined to oak, but I have no proof that this is the case.

Time of Appearance.—The egg throughout the winter, the caterpillar in June, the chrysalis in June, and the butterfly in July and August.

Localities.—In Ireland Mr. Birchall found it common in the counties Wicklow, Dublin, and Kerry: it has not been observed in the Isle of Man. Dr. Buchanan White remarks that "it is a rarer species in Scotland and Perthshire than the Green Hairstreak; it occurs in several places in the lowland part of the county of Perth as far north as Dunkeld: although found in Argyleshire, it does not seem to occur everywhere in the south of

Scotland, as might be expected, being common in England." Dr. White took it on the 9th of August in 1859, and on the 28th June in 1860. In a "List of Lepidoptera Observed in the Vicinity of Dumfries," Mr. Lennon, the author thereof, states that the Blue Hairstreak is found in Comlorgan Wood, and at Dalscairth: the former an ancestral possession of Lord Mansfield's, about ten miles south of Dumfries, and near the coast; the latter on the slope of the wooded hills that bound to the west the valley in which the town is situated. It is reported from all the English counties wherever lists have been received, and my own experience is that it flies in some abundance about the oak-trees in all our woods in the south.



34. Black Hairstreak (*Thecla W-Album*). Upper side.



Under side.



Under side of a Variety in the cabinet of Mr. Bidwell.

34. Black Hairstreak.—The costal margin of the fore wings is nearly straight, the tip scarcely pointed, and the hind margin simple. The hind margin of the hind wings is slightly scalloped, and the wing is produced, and has a very decided tail near the anal angle. The colour is black-brown, except a spot on each fore wing near the costal margin, and rather nearer the base than the tip of the wing. This spot looks as though it were semitransparent, and is of a dull smoky tint. At the anal angle of the hind wings there is an orange speck; the fringe is snowy white on the inside, black on the outside; on the tail it is quite white. The under side is grayish-brown; the fore wings have a narrow transverse waved, snowy white line rather beyond the middle; before it reaches the costal margin this line turns abruptly towards the tip of the wings: the hind wings have a snowy white transverse line, commencing at the costal margin, and at first almost straight, but afterwards forming a letter W, and then, turning upwards, it approaches the end of the butterfly's body; between this and the hind margin is a bright orange-red band, bordered above by a scalloped black line, and below by a series of semicircular black spots; both above and below this orange band is a very slender whitish streak.

Life History.—The eggs are laid on the twigs of the elm and wych elm (*Ulmus campestris* and *U. montana*) in July and August, and are shaped something like an orange, but are more depressed on the crown; they are of a whitish or putty colour, and remain firmly glued to the rind of the twigs throughout the winter. The full-fed caterpillar rests on the surface of the leaves; its head is very small and shining, and is retractile within the second segment; the body is shaped like a woodlouse, the incisions between the segments being distinctly marked, and each segment having its posterior margin slightly produced and overlapping the anterior margin of the next following segment; there is a shallow mediodorsal furrow, which bisects the ridges already described; the lateral margins of the segments are dilated, and the legs and claspers completely hidden. Every part of the body emits delicate hairs, which are very visible when the caterpillar is viewed in profile. The head is black and shining; the body delicate pea-green, the ridges bordering the dorsal furrow

being tinged with yellow, and the furrow itself tinged with brown. On each side of each segment are two slender oblique lines of a yellowish-white colour. When the caterpillar is at rest, the upper of these lines on each segment meets the lower line on the next segment, thus forming a series of eight oblique lateral lines. The CHRYSALIS is short and stout, attached to a twig, or sometimes to a leaf, by a belt, and also by the anal extremity—*Newman.*

TIME OF APPEARANCE.—The egg has been found in the winter glued to the rind of elm twigs; the caterpillar has been beaten in June, and the butterfly taken on the wing in July.

LOCALITIES.—Mr. Birchall has not met with this butterfly in Ireland or the Isle of Man, nor does Dr. Buchanan White mention having observed it in Scotland. In England it is very widely distributed, and sometimes occurs abundantly; still it cannot be considered a common butterfly.

Berkshire. At Burghfield, near Reading, this insect appeared in the greatest profusion in my own garden in 1829 or 1830—*C. S. Bird.*

Buckinghamshire. In gardens—*William Walker.*

Cambridgeshire. Generally distributed in the county—*Thomas Brown.*

Derbyshire. Darley, Calke Abbey—*H. H. Crewe;* Cubley, one specimen—*Joseph Greene.*

Dorsetshire. Buckland Newton very many years ago. I possess the specimen—*J. C. Dale.*

Essex. Epping—*Edward Doubleday;* in Bergholt Woods, near Colchester—*W. H. Harwood.*

Gloucestershire. Near Gloucester, but rare—*Joseph Merrin;* Clifton—*Alfred E. Hudd.*

Hampshire. One specimen has been taken in the New Forest—*G. B. Corbyn;* one specimen at Southsea—*Henry Moncreaff.*

Herefordshire. One caterpillar taken at the Bache—*Mrs. Hutchinson;* rare at Oakley Park—*F. E. Harman.*

Huntingdonshire. Near Stilton—*J. C. Dale.*

Kent. Neighbourhood of Bridge, near Canterbury occasionally—*W. O. Hammond;* caterpillar on elms near the Fox and Hounds public-house at Darenth Wood—*E. Newman.*

Lincolnshire. In Lincolnshire—*T. H Allis.*

Northamptonshire. Barnwell Wold in July—*William Bree.*

Nottinghamshire. One specimen at Newark—*George Gascoyne;* Willin Wood, near Ollerton, rare—*R. E. Brameld.*

Shropshire. Benthall Edge—*C. G. Barrett.*

Somersetshire. Brockley—*A. E. Hudd.*

Staffordshire. Burton-on-Trent and Brinlincote—*Edwin Brown.*

Suffolk. Generally distributed over the county—*H. H. Crewe;* Brandeston and Playford—*Joseph Greene;* one specimen at Wolsingham Park—*W. M. Crowfoot;* Dodnash Wood—*W. H. Harwood;* Haverhill—*W. Gaze;* Sudbury—*W. D. King.*

Surrey. Guildford, Godalming, Witley, Cobham—*E. Newman.* This species is usually esteemed a rare insect in the neighbourhood of London, and previously to the last season I never saw it alive; but the boundless profusion with which the hedges for miles, in the vicinity of Ripley, were enlivened by the myriads that hovered over every flower and bramble-blossom last July exceeded anything of the kind I have ever witnessed. Some notion of their numbers may be formed when I mention that I captured, without moving from the spot, nearly two hundred specimens in less than half an hour, as they approached the bramble-bush near which I had taken up my position. I am perfectly unable to account for their prodigious numbers, as the same fields and hedges had been carefully explored by me at the same and at different periods of the year for several preceding seasons without the occurrence of a single specimen in either of its stages; and it is worthy of remark that the hedges to the north and north-east of Ripley were perfectly free, although the brambles, &c., were in plenty.—*J. F. Stephens.* My lamented friend has often told me of this "miraculous draught" of the Black Hairstreak, but although then living near the spot, and always on the alert for captures,

I have never seen, much less taken, at least so far as I can now recollect, two specimens of this butterfly on the same day.

Sussex. Frenchlands Woods abundant—*J. H. White;* Abbot's Wood—*C. V. C. Levett;* in Sussex generally—*W. H. Draper.*

Worcestershire. One specimen was captured near Worcester on the authority of *Dr. Hearder;* it once occurred at Great Malvern, but I have heard of none lately—*W. Edwards.*

Yorkshire. The caterpillar is common on wych elms near Doncaster—*Geo. T. Porritt;* near York and Sheffield—*Edwin Birchall;* Edlington Wood, near Barnsley—*J. Harrison;* very numerous near Doncaster in 1860—*Alfred Ecroyd;* Sheffield, at Warncliffe Wood—*Edwin Birchall.*



35: Dark Hairstreak (*Thecla Pruni*). Upper side.



Under side.

35. Dark Hairstreak.—The fore wings are nearly straight on the costa, blunt at the tip, and simple on the hind margin; the hind margin of the hind wings is slightly scalloped; it is produced at the anal angle, and has a small but very decided tail: the upper side is dark brown, with a series of red-brown spots parallel with the hind margin of the hind wings; these spots are generally four in number, the two nearest the anal angle being larger and brighter than the other two; at the anal angle is a vague but perceptible spot composed of metallic blue scales; the margin itself is black, but its fringe pale. The under side is brown, inclining to fulvous; on the fore wings is a broken transverse snow-white line, about a third of the distance between the tip and the base; outside of this—that is, nearer the hind margin—is an indistinct row of red-brown spots; those nearest the tip of the wing are least distinct; those nearest the anal angle most so; and the two largest are accompanied by a small jet-black spot, with a snow-white margin: the hind wings have an oblique transverse snow-white line extending from the costal margin towards the anal angle, but not reaching it; parallel with the hind margin is a broad band of orange-brown, and on each edge of this band is a series of pure black spots, bordered on the outside with snowy white; the black spots in the inner series are nearly round, and the blueish white border of each is of a crescentic form; the black spots in the outer or hind-marginal series are semicircular, and ornamented, especially at the anal angle, with metallic blue; the white border below these markings is straight.

Obs.—In September, 1828, a member of the Entomological Club purchased a number of these butterflies of a Mr. Seaman, then a well-known dealer in objects of natural history, and resident at Ipswich. The purchase was made under the impression that the butterflies were the Black Hairstreak, then a desirable insect to obtain. The purchaser most kindly distributed among the members of the club, then in its infancy, some of the specimens, and I became a recipient. The specimens are still in my possession. On examining them, and comparing them with such specimens of *W-album* as I then possessed, it immediately became manifest to me that the newly-captured species was essentially different, not only on the upper, but also on the under side. Of course, I made it my business to work out the name of the supposed novelty, and soon found, on comparing it with a continental figure, that the new insect was *Thecla Pruni,* and the old one *Thecla W-album.* Like all beginners, I was proud of my discovery, and eager to communicate the intelligence. The late Mr. J. F. Stephens then received entomologists

every Wednesday evening, and in the most kind and generous manner opened his rich cabinets, and imparted his great entomological knowledge to every one who applied for information. The first Wednesday evening subsequent to my making the discovery found me at the residence of this patriotic entomologist: that night I was his earliest and most enthusiastic visitor. He gave the subject an immediate investigation, and promptly acquiesced in the necessity for a change of name, but at the same time threw a damper over my enthusiasm at the supposed discovery of a new British butterfly, by expressing a doubt whether it was British at all; and represented the intense and praiseworthy desire to do business which was prevalent among dealers in insects as occasionally overcoming the love of truth. Seaman, unconscious of the value of his capture, had given the real and now familiar locality of Monk's Wood as its habitat, and it was so announced when he first disposed of them; but no sooner was it made known that the butterflies were not the Black Hairstreak at all, but a species new to Britain, than the locality became a mine of gold; and Mr. Seaman very judiciously concluded to remove the mine to a greater distance, even to *ultima thule* of his geographical knowledge, Yorkshire; and Mr. Curtis, who published the insect under its correct name shortly afterwards, gave Yorkshire as the locality where it has been found. Benjamin Standish, of happy memory, was at that time in full possession of his insect-hunting powers, and also of an imaginary estate and baronetcy in the north of England: how often were he and I companions to Darenth and to Birch; he was fired with ardour at the "turning up" of a new butterfly, and we consulted long and often on the expediency of a trip to Yorkshire in quest of the old baronetcy and the new Hairstreak. Alas! all the actors in this little comedy, except myself, have been removed from works to rewards; the estate and baronetcy have gone by another and perhaps a more direct line; and the once "new" Hairstreak is in the butterfly market at a very moderate price.

LIFE HISTORY.—The EGG is laid on the twigs of the blackthorn (*Prunus spinosa*), and remains attached to it all the winter; the young CATERPILLAR feeds on the leaves. When full fed the caterpillar is woodlouse-shaped, the head being small and retractile within the second segment: the body is very convex on the back, with a shallow medio-dorsal furrow, and the edges of the segments adjoining this appear from the figures to form two parallel series of projecting points; the colour is pale green, the crests of the ridges and a narrow lateral stripe being yellow; the CHRYSALIS is attached by a belt, and by the anal extremity; it is obese, blunt-headed, and humpbacked, and has a medio-dorsal series of five rather conspicuous warts or tubercles.—*Esper's and Hubner's figures.*

Obs.—I have never seen either the caterpillar or chrysalis of this species, and have relied solely on published figures, which Mr. Doubleday assures me are correct.

TIME OF APPEARANCE.—June and July.

LOCALITIES.—*Thecla Pruni* is unknown in Ireland, Scotland, and the Isle of Man; its range in England seems confined to five counties.

Derbyshire. In a box of insects captured within a few miles of Chesterfield I find this very local species—*J. R. Hind*, "*Intelligencer*," vol. ix., p. 27.

Huntingdonshire. Monk's Wood, on the 4th and 6th of July, but in shattered condition—*J. F. Stephens;* Monk's Wood, just appearing on the 18th June—*H. Doubleday;* near Peterborough—*Frederick Bond;* common in Overton Woods and about St. Ives, and elsewhere in Huntingdonshire—*T. H. Allis.*

Monmouthshire. I have taken a single specimen in St. Julian's Wood—*George Lock.*

Northamptonshire. Very plentiful some years, rare in others, at Barnwell and Ashton Wolds in July—*William Bree;* near Towcester—*Hamlet Clark;* Barnwell Wold—*Frederick Bond;* on the 19th June I captured three dozen *Pruni*, flying round the flowers of the wayfaring tree (*Viburnum lantana*) at Kettering—*W. Sturgess*, in "*Intelligencer*," vol. iv., p. 111.

Suffolk. Brandeston and Playford—*Joseph Greene.*



36. Brown Hairstreak (*Thecla Betulæ*). Male, Female, and Under side.

36. Brown Hairstreak.—The costal margin of the wings is nearly straight, the tip obtuse, and the hind margin simple; the hind wings have the hind margin slightly scalloped, and it is produced at the anal angle into a square lobe, and near this, supported by the next wing ray, is a very decided tail. The colour is rich glossy umber-brown, with a large oblique and somewhat kidney-shaped orange-red blotch beyond the middle of the wing; this blotch contains on the edge nearest the base of the wing a crescentic dark brown discoidal spot: the hind wings have the lobe at the anal angle, and the tail orange red, the fringe is white. The under side is glowing fulvous gray, approaching to orange colour; the fore wings have two transverse white lines descending from the costa and towards the inner margin, and meeting before they reach it, thus enclosing an acutely triangular space, between which and the base is a short transverse space similarly enclosed by white lines: the hind wings have two oblique transverse white lines, both of which descend from the costal margin; that nearest the base terminates at the middle of the wing, the other is slightly waved, and terminates on the inner margin near the angle; the hind margin is bright rust-coloured. Such is a description of the female; the male is smaller, and differs in wanting the orange blotch on the upper side, and in having the under surface fulvous gray.

Life History.—The egg is a depressed sphere and white; it is attached to the twigs of blackthorn (*Prunus spinosa*) in the autumn, often as late as the end of September or beginning of October; it is not hatched until the spring, and the young caterpillar feeds on the blackthorn, generally concealing itself beneath the leaves: when full fed it rests in a flat position on the leaf of the blackthorn, with its head, legs, and claspers concealed, and it does not abandon this position readily: when compelled to do so, it falls about three inches and hangs by a thread. The head is almost globular, but slightly produced towards the mouth: it is scarcely half so wide as the second segment; indeed, the head may be said to be retractile within that segment: the body is shaped somewhat like a little boat turned keel upwards: the sides are dilated all round, even including the second segment, the anterior margin of which projects beyond the head: the segments are deeply and distinctly divided, so much as to give the back, when viewed sideways, a serrated appearance; the dilated sides and dorsal keel are each garnished with a fringe of stiff hairs; this fringe is double on the dorsal keel, which is bisected by a shallow and inconspicuous medio-dorsal furrow, but single on the lateral dilation; on the former each hair is curved into the segment of a circle, and its end is directed backwards; on the margin each hair is also curved, but more slightly, and its end is directed downwards. The colour of the head is brown, and its surface very glabrous; that of the body apple-green, with four narrow longitudinal whitish stripes, and two oblique lines on the

same hue on each side of each segment; two of the longitudinal stripes are dorsal, they are distant on the second and third segments, gradually approach on the fourth and fifth segments, and thence run parallel to the thirteenth; the other stripes are lateral, and, running completely round the margin of all the segments of the body, unite on the second and thirteenth segments; on the second segment are two short pale longitudinal lines, side by side: the ventral surface, including the legs and claspers, is pale semi-transparent glaucous green, with a vague medio-ventral smoke-coloured stripe, probably due to the presence of food in the alimentary canal. Those caterpillars in my possession were full fed early in June, and changed to CHRYSALIS before the end of the month; these were smooth and without projections, and were of a pale semi-transparent brown colour; they were unattached either by a belt or by anal hooks, and remained at the bottom of the receptacle in which the caterpillars had been fed until they emerged in the winged state during my absence from home in July.—*Newman.*

TIME OF APPEARANCE.—The egg is to be found during the winter firmly glued to the twigs of blackthorn, the caterpillar on the leaves of the same in May and June, and the butterfly is on the wing in July, August, September, and October.

LOCALITIES.—Mr. Birchall says this species is very common in the lanes and on roadside hedges in the south and west of Ireland in August, frequenting the flowers of the bramble, and settling the moment the sun is obscured, when it may readily be taken with the fingers; it has not been observed in Ulster or Leinster. Mr. G. F. Mathew observed it at Blarney, near Cork. It has not yet been noticed in the Isle of Man, or in Scotland. In England it is very widely distributed, but still sufficiently uncommon to warrant the enumeration of a few localities:—

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Claydon — *H. H. Crewe.*

Cambridgeshire. Generally distributed throughout the Cambridge district—*Thomas Brown.*

Cumberland. I have seen one specimen in Barron Wood, near Carlisle—*J. B. Hodgkinson.*

Devonshire. Abundant, both as regards number of localities and number of specimens; near Exeter—*J. Hellins;* Bickleigh Vale, near the Cider House; Bickleigh Bridge; Shaugh Bridge; Horrabridge; Dewerstone—*Geo. C. Bignell;* Whistman's Wood, near Princetown, Dartmoor; Moreton Hampstead; Tavy Vale, near Virtuous Lady Mine; Cann Wood Meadows; Plym Bridge; Torquay; Buckfastleigh; Axminster; Sidmouth—*J. J. Reading.*

Dorsetshire. Glanville's Wootton, Middlemarsh Wood, but not very lately—*J. C. Dale.*

Essex. Very abundant in Epping Forest in the caterpillar state, especially about Loughton and High Beech—*W. J. Argent.*

Glamorganshire. Scarce—*Evan John.*

Gloucestershire. Near Gloucester, but scarce—*Joseph Merrin.*

Hampshire. Near Brockenhurst, but not common in the New Forest—*G. B. Corbin;* Kimpton, near Andover—*J. C. Dale.*

Huntingdonshire. Monk's Wood—*F. Bond.*

Kent. Woods and lanes about Sheldwick—*H. A. Stowell;* caterpillar once only in the neighbourhood of Eastry—*W. O. Hammond;* Darenth Wood and skirts of Birch Wood, always at rest on flowers—*E. Newman.*

Lancashire. Not uncommon at Grange—*J. B. Hodgkinson;* Silverdale—*James Murton.*

Lincolnshire. *T. H. Allis.*

Northamptonshire. Rare in Barnwell Wold—*William Bree;* near Towcester—*Hamlet Clark.*

Suffolk. Dodnash Wood, not common—*W. H. Harwood;* Haverhill—*William Gaze.*

Sussex. Poyning's Wood—*William Buckler;* woods near Henfield—*W. H. Draper.*

Westmoreland. Witherslack in August and September—*J. B. Hodgkinson.*

Wight, Isle of. Rare near Ryde—*Frederick Bond;* I saw this insect at Whippingham several years ago, but not lately; I believe it is rare in the island—*James Pristo.*

Wiltshire. Reported as having been taken near Great Bedwyn and in West Woods; scores have been taken by the pupils at Marlborough College—*T. A. Preston.*

Worcestershire. Trench Wood, not common—*J. E. Fletcher.*



37. Large Copper (*Polyommatus Hippothë*). Male.



Female.

37. Large Copper.—The four wings are nearly straight on the costa, and almost pointed at the tip; the hind margin is simple and entire; the hind margin of the hind wings is slightly waved: the colour of the upper side is brilliant fiery copper in the male; the fore wings have a narrow black hind margin, and a small transversely oblong black spot halfway between the base and tip, and between this and the base of the wing is an indistinct black dot: the hind wings have a black notched hind margin, and a short, slender, median streak; the inner margin is also tinged with black. In the female the fore wings have a black hind-marginal band, broader than in the male, a transverse series of seven oblong black spots parallel with the hind margin, and three other black spots in a straight series between this and the base of the wing: the hind wings are smoky black-brown, with a broad copper-coloured band parallel with the hind margin. Although so different on the upper side, the sexes are alike on the under side; the fore wings are orange-red with gray hind margin, and seventeen velvety black spots, eleven of which are encircled with pearly gray; the others are less distinct, and form a series parallel with the hind margin: the hind wings are pearly gray, with an orange band parallel to the hind margin, and fifteen black spots on the disk, all of which have a pale gray circumscription; on each side of the hind-marginal orange band, and close adjoining it, is a series of rather indistinct black spots.

Varieties of this species are not common; in those that have passed through my hands there has been a remarkable uniformity of colouring, but Mr. Dale informs me he possesses a female almost entirely black.

Life History.—The egg is laid on the leaves of the great water-dock (*Rumex hydrolapathum*) during the month of August, and the young caterpillars (never, to the best of my belief, observed) probably emerge during the following month, and hybernate very early at the base of the petioles, a situation in which they would be particularly liable to injury, and indeed destruction, from the long-continued floods of such frequent occurrence in the aqueous districts, which constitute the sole English habitats of this brilliant butterfly. The caterpillar is full fed in June, and then lies flat on the dock-leaf, rarely moving from place to place, and, when it does so, gliding with a slug-like motion, the legs and claspers being entirely concealed. The head is extremely small, and can be completely withdrawn into the second segment; the body has the dorsal surface convex, the ventral surface flat; the divisions of the segments are distinctly marked, the posterior margin of each slightly overlapping the anterior margin of the next, and the entire caterpillar having very much the appearance of a *Chiton;* the sides are slightly dilated; the legs and claspers are seated in closely approximate pairs, nearly on a medio-ventral line. The colour is green, scarcely distinguishable from that of the dock-leaf; there is an obscure medio-dorsal stripe, slightly darker than the disk, and in all probability due to the presence of food in the alimentary canal. The chrysalis is obese, blunt at both extremities, attached by minute

hooks at the caudal extremities, and also by a belt round the waist—*Newman.*

Obs.—My acquaintance with the caterpillar and chrysalis was made very many years ago, in Mr. Doubleday's garden at Epping, where the very plant of *Rumex hydrolapathum* on which the caterpillars fed is still in existence.

Time of Appearance.—Caterpillars, beginning of June, 1841; 24th July, 1827; chrysalids, 25th July, 1827; butterflies, 25th June, 1826; 3rd and 5th July, 1833; 19th July, 1827; August, 1819; August 4th, 1821—*J. C. Dale.*

Localities.—This beautiful butterfly has never been known as an inhabitant of Ireland, the Isle of Man, or Scotland. In England it formerly occurred in abundance in two localities mentioned below, but it is now believed to be extinct.

(Cambridgeshire. In plenty at Whittlesea Mere—*J. F. Stephens;* not taken in Cambridgeshire since 1845—*Thomas Brown.*)

(Huntingdonshire. Yaxley and Holm Fens. The latest capture, consisting of five specimens, was made by Stretton, in either 1847 or 1848: they were all purchased by Mr. Harrington. I was at Yaxley for several successive years after this, but never saw another specimen, or heard of another being taken—*F. Bond.*)



38. Common Copper (*Polyommatus Phlæas*).

38. Common Copper.—The costal margin of the fore wings is nearly straight, the tip almost pointed, and the hind margin simple; the hind wings are notched near the anal angle, and on each side of the notch is a small angular projection. The colour of the fore wings is coppery red, with a dark brown hind margin and nine black spots on the disk; seven of these form a zigzag series parallel with the hind margin; and two are situated between this series and the base of the wing: the hind wings are black-brown, with an indented hind-marginal copper-coloured band. The under side of the fore wings is fulvous, with nine black spots on the disk, and a fulvous-gray hind margin: the hind wings are fulvous-gray, with ten black dots on the disk, and a series of five reddish crescents parallel with the hind margin.

Varieties.—There is a variety of this species in which the parts which are usually copper-coloured are of a pure and brilliant white. This is of frequent occurrence on the continent of Europe, but appears to be of uncommon occurrence in this country. At page 93 of the fourth volume of the "Entomologist," Mr. Clark, of Doncaster, writes: "On May 19th a friend of mine took a most curious variety of *Phlæas*, the part which is usually of a bright copper colour being of a splendid silvery white." Several other English specimens have been recorded, and kindly offered me to figure, and I have declined them simply from the difficulty of exhibiting the differences in a woodcut. There is also a great discrepancy in the colour of the costal margin of the fore wings; in many specimens, generally supposed to be females, this is dull dark brown; while in others the copper colour comes up to the costa: again the black spots forming the transverse series are various in size, in some specimens being much larger than in others, and being more or less connected, three near the costa and two pairs between the costa and the inner margin: and again, the wing-rays are brown in some specimens, but concolorous with the disk in others; lastly, many specimens have a series of four blue spots just above the copper-coloured band on the hind wings: these characters—that is, the larger black spots, the darker costal margin, and the blue spots—I formerly described as characteristic of the female, and I still think this is generally, but not exclusively, the case. Mr. Dale mentions a specimen without the copper-coloured band on the hind wings, but only having a few copper-coloured spots in its place. At page 211 of the third volume of the "Entomologist," Mr. C. S. Gregson describes the varieties of *Phlæas* in his own cabinet as under:—"This

species has had my especial attention for many years, and the result is a long row of aberrations; one with small red spots on the fore wings, and a broad red band on the hind wings; one dull brownish; six without markings on the hind wings; one very large, with red pencil-like streaks on the rays of the hind wings; one with one silver fore wing, all else proper; one with both fore wings silvery, the hind wings proper; six with all the copper-colour turned to silver—one of these is truly magnificent." Mr. J. A. Clark, of Hackney, has most obligingly placed in my hands some beautiful specimens, varying in the same way.

LIFE HISTORY.—Without that attentive and unremitting observation which I believe has not hitherto been bestowed on the subject, I am unable to say with anything approaching to certainty whether we have one, two, or three broods of this brilliant little butterfly in the course of the year; its greater abundance at the beginning of June, the beginning of August, and beginning of October, favour the idea that there are three broods; and it is quite certain that many of those caterpillars which we find during the entire month of August, and which become chrysalids in September, appear as butterflies at the end of that month or beginning of October; are we to suppose that some of the chrysalids remain in that state throughout the winter, and do not effect their final change until the following summer, so that the October and June flights are really portions of the same brood? The EGG is laid on the leaves of several species of dock (*Rumex*), as *R. obtusifolius*, *R. pulcher*, *R. acetosa*, *R. acetosella*; and the CATERPILLAR emerges in a few days, not less than ten, and seldom more than fifteen; it is full-grown in about twenty days, and then rests on the under side of the dock leaf in a flat position, closely appressed to the surface; if disturbed or annoyed it falls from its food-plant, and assumes a crescentic form, the two extremities approximating, but not meeting; after a time it resumes its wonted appearance, and glides over the surface of any object on which it may happen to rest, exactly in the manner of a slug, no separate motion of the body or legs being perceptible. The head is very small, and entirely concealed within the second segment; the body is formed like that of the familiar multivalve shell known as a *Chiton*, the divisions of the segments being clearly defined, and the posterior margin of each being curvilinear, and overlapping the anterior margin of the next succeeding segment; the dorsal surface is convex, and sprinkled with numerous extremely minute warts and slender bristles; the ventral surface is flat, the legs and claspers forming a medio-ventral double series, and each pair being closely approximate and far removed from the margin. The colour of the head is dingy green, with a few dark brown markings; of the body, opaque apple-green, the warts being white and the bristles sienna-brown: in some specimens the green is interrupted by three stripes of a delicate purplish pink, one of them medio-dorsal, the others marginal. When full fed it attaches itself to the under side of the leaf or to a petiole, and undergoes its change to a CHRYSALIS, which is obese and short; the body is particularly stout; the head rounded and without angles or ears; the anal extremity is also rounded and without points, the extreme tip incurved and furnished with minute hooks, by which it is attached to the web previously spun by the caterpillar; it is also fastened by a belt round the waist: the entire dorsal surface, and the abdominal portion of the ventral surface, are beset with short and stiff bristles, each of which is dilated at the extremity, and has the appearance of a stalked gland, similar to those which occur so commonly on plants: I do not find any of these processes on the cases of the antennæ, legs or wings, but they occur freely on every other part of the chrysalis. The colour is dull pale brown, approaching to putty-colour, and sprinkled or variegated with dark brown, approaching to black: these dark markings are grouped into a medio-dorsal series, almost forming a continuous stripe from the head to the anal extremity; they also form three lateral series of spots on each side; of these that series nearest the medio-dorsal stripe is

composed of very small spots, and is often indistinct, while the others are invariably distinct and strongly pronounced; similar spots occur on the ventral surface; the dark dots form oblique series on the wing-cases, and also on the cases of antennæ and legs—*Newman.*

Obs.—At p. 41 of the third volume of the "Entomologist," Mr. Moncreaff says: "On the 17th December last, I found a number of the caterpillars of *Phlæas* feeding on dock and ragwort; they are now hybernating, and are very small. This proves that this species passes the winter in the caterpillar state."

Time of Appearance.—Throughout the summer and autumn. Mr. Wailes, in his "Catalogue," so often quoted, says—"Of this gay little butterfly there are broods in April, June, and September;" and Mr. Dale took it at Wimborne as late as the 5th of November. It is very common at the end of September; I never recollect seeing so many together as on the 30th of September last at Elm Hall, Wanstead. A bed of verbenas seemed a great attraction to them.

Localities.—Mr. Birchall informs us that this pretty little butterfly is common in Ireland; Mrs. Battersby says it is very common at Cromlyn, and Mr. Fetherstonehaugh says it is abundant at Glenmore, Crossmolina. Mr. Birchall has taken it in the Isle of Man. Dr. Buchanan White says that in Scotland it has not been seen farther north than Inverness-shire; it is found both in the lowland and highland districts of Perthshire, but more commonly in the former; he has also taken it in Kirkcudbrightshire and Fifeshire. Mr. Campbell found it abundant at Millport. In England it is abundant, and generally diffused; but in the very complete lists from Cumberland and Westmoreland, kindly forwarded me by Mr. Hodgkinson, the name does not occur; it is, however, present in every other county list, and generally accompanied by such observations as "common," "very common," "abundant."

39. Pea-pod Argus.—The costal margin of the fore wings is slightly but regularly arched;



39. Pea-pod Argus (*Lampides bœtica*). Upper side of Male and Female.



Under side.

the hind margin is also slightly arched. The hind wings are rounded, and have a long, slender, and somewhat twisted tail near the anal angle. This tail is continuous with the last of the longitudinal wing-rays, that nearest the inner margin of the wing. The colour of the upper side is dull pale smoke-colour, glossed with purple, lilac, or blue reflections. In the male these are spread very sparingly over the entire surface of the wings, but in the female they are concentrated, and form a large blotch on the fore wings, and cover the base of the hind wings: the blue blotch on the fore wings extends from the base to the middle of the wing, and occupies also the basal half of the inner margin, but does not reach either the costal or the hind margin; the blue surface seems to be due to the presence of numerous long hair-like scales of that colour. On the hind wings is a series of compound spots parallel with the hind margin. These spots are of different degrees of intensity—that nearest the anal angle is always distinct,

and the next following is still more so; the rest gradually decrease in distinctness, until almost obliterated towards the apex; they consist of a dark centre and pale circumscription. Above, and parallel with this series, there is frequently a very faint series of pale spots, sometimes of a crescentic form; but in many specimens these are scarcely discernible. The under side is dark brownish gray, with numerous transverse ashy gray markings, a series of which, in the form of crescents, runs parallel with the hind margin of all the wings; and on the hind wings this pale colour often assumes the form of a transverse bar between the hind margin and the middle of the wing. At the anal angle of the hind wing are two compound spots, which are black in the centre, and orange above, and their lower border is decorated with brilliant metallic green. Continuous with a wing-ray which passes between these two spots is the long slender tail already described.

Life History.—The last-disclosed females of this species lay their eggs on the twigs of the bladder senna (*Colutea arborescens*), but like those of several, and perhaps all, the British species of this family, they do not hatch until the following summer, at which season the young pods of the senna are sufficiently advanced to serve as the food of the young caterpillar, which at first is almost black, and then feeds on the scarcely-formed pods; subsequently, it enters the pods through a nearly circular aperture, and devours the seeds; before attaining its full size it migrates frequently from pod to pod, only devouring the seed in the interior: it rests on the pods or on the twigs in a straight position, its shape scarcely allowing of any other. The head is very small, scarcely half so wide as the second segment, into which it is susceptible of being withdrawn, and thus entirely concealed: the body is shaped like a wood-louse, the dorsal area convex, the ventral area flat, and the incisions of the segments are very clearly marked. The colour of the head is black: the dorsal area of the body olive-green, reddish brown, or bright green; there is a dark, moderately wide, and perfectly continuous medio-dorsal stripe, extending from immediately behind the head to the anal extremity, and also a white lateral stripe below the spiracles, which are yellow; immediately above each spiracle, with the exception of the first and last, there originates a rather short line, which passes obliquely forwards and upwards towards the medio-dorsal stripe, but never unites with it; these oblique lines are longitudinally double throughout, the upper part being darker, and the lower paler than the ground colour; the claspers are concolorous with the ventral area; the legs are brown. When full fed this caterpillar never remains within the bladder on the seeds of which it has fed, but (generally in the month of September) it escapes from the pod which had last served as its dwelling-place, and either descends among the dried leaves or attaches itself to a branch of the shrub, and in five or six days assumes the chrysalis state. The chrysalis is attached by a belt round the middle to the stem of the food-plant; it is obese, and rounded at both extremities; its colour is testaceous yellow or dull red, adorned with brown dots, which are particularly numerous about the crown of the head; there is also a continuous dark line in front, extending from the thorax to the anal segment; the spiracles are black, and plainly discernible with the naked eye. The caterpillar is infested by a minute ichneumon (*Microgaster glomeratus*), fourteen or fifteen of which frequently feed on a single caterpillar, and these, escaping through the skin of the butterfly-caterpillar, spin a cluster of little yellow cocoons, attaching them to the stalks or leaves of the food-plant—*Millière*.

Obs.—I have extracted the foregoing particulars from M. Millière's beautiful work, kindly lent me by Mr. Doubleday, from whom I obtain the additional information that the caterpillar is also found feeding in the pods of the field pea.

Time of Appearance.—In France this butterfly emerges from the chrysalis in September, and continues to fly throughout October. In this country it may occur in our pea fields now and then, but its existence must be very

precarious, because the egg would, in all probability, perish with the pea-haulm, which is rarely kept through the spring and early summer.

Localities.—From an examination of the long series in the British Museum, I find this insect, like *Pyrameis Cardui*, to be distributed over all parts of the habitable globe where agriculture has been introduced. In Britain it is evidently only a straggler: it has never been observed in Ireland, Scotland, or the Isle of Man, and I know of but three records of its occurrence in England.

Hampshire. One specimen was taken by Mr. Latour, near Christchurch, not many miles from Dorset, on the 4th of August, 1859—*J. C. Dale.*

Sussex. Two specimens have been taken at Brighton, on chalk downs facing the sea, by Mr. M'Arthur—the first on the 4th of August, 1859, the other on the 5th of the same month; I have seen both the specimens, and have no doubt whatever as to the species or the veracity of the captor. During the year 1859, in which these captures were made, the insect was very abundant in the Channel Islands and on the coast of France. I am indebted to Mr. Thorncroft for my first information of these captures.



40. Silver-studded Blue (*Lycæna Ægon*). Male and Female. Upper side.

40. Silver-studded Blue.—On the upper side the colour of the male is purple-blue, shaded to black towards the hind margin; of the female smoky black, sometimes tinged with blue, and generally having a transverse series of orange-coloured spots, diversified in form, parallel with the hind margin. The under side is bluish gray, with seven black spots on the fore wings and eleven on the hind wings; all these spots have a pale circumscription; parallel with the hind margin of the hind wings is a series of seven orange-



Under side.

coloured spots, each of which is bordered above by a black crescent, and below by a silver-blue spot; immediately above this series the disk of the wing is of a pale gray; the fringe is white and unspotted.

Life History.—At page 241 of No. 58 of the "Entomologists' Monthly Magazine," dated March, 1869, Mr. Buckler has given a very complete "natural history" of this little butterfly. Trusting implicitly to his well-known accuracy, I have copied it entire. The eggs were procured by Mr. C. G. Barrett, who had induced a female to lay them on twigs of heather. "Considering the small size of this butterfly, the egg is rather large in proportion: it is white in colour, of a circular form, flattened and depressed in the centre both above and below, ribbed and beaded boldly at the sides, and from thence more finely by degrees to the centre. The egg does not change colour, but retains its pure dead-white appearance even after the exit of the caterpillar; a small hole, showing like a black spot on the side of the shell, alone betraying the escape of the little creature." In accordance with a suggestion of Mr. Doubleday, who had observed the female butterfly alighting on the common bird's-foot trefoil (*Ornithopus perpusillus*), Mr. Buckler offered the young caterpillars that plant for food, and found it so acceptable to them, that he considers there is little doubt of its being the natural food of the species. "When first hatched, the caterpillar is about three-fourths of a line long, thick in propor-

tion of equal bulk, and rounded at either end, hairy, and of a dull bluish-green colour, its powers of locomotion of the very feeblest description. By the third of May they had become rather more than a line in length and of a drab colour, and hairy like the leaflets on which they were feeding. By the 29th of May they had grown to about a quarter to three-eighths of an inch in length, eating, not through the leaflets, but only the green cuticle. At this time they were of a deep yellowish gray, and the dorsal stripe blackish olive, edged with whitish, and a whitish stripe along the lateral ridge above the legs; the sub-dorsal stripe being triple, *i.e.*, two lines of blackish-olive with a whitish-gray one between them; the surface generally studded with minute blackish points, each bearing a fine short hair. From the 11th to the 15th of June they had all assumed their last coats. The full-grown caterpillar is about seven lines long, thick in proportion, and of the usual onisciform or *Lycœna* shape. The head is small, and retracted when at rest or alarmed, the second segment the longest, rounded, and very slightly flattened above; the others, as far as the tenth, have raised prominences on each side of the back, and a dorsal hollow between them, the sides sloping to the lateral ridge; the ventral surface is rather flattened; the legs all placed well underneath. The last three segments are without dorsal ridges, and slope gradually to the sides and anal extremity; their sides are rather concave, and there is a very prominent wart on each side of the twelfth; the segmental divisions are not observable on these last, but are well cut on all the others. In colour the caterpillar is now a bright yellow-green, with the dorsal stripe blackish-brown, edged with whitish from the beginning of the third to end of the tenth segment; it is widest on the third and fourth, being on them of a rather rounded lozenge form, with a whitish dot near the edge on each side; there is a dull dark brown small plate in front of the second segment, and a broad semi-lunar-shaped blotch of the same colour a little behind, and divided in the middle by a fine line of the green ground-colour. The dorsal stripe on the eleventh segment becomes broad and squarish, but resumes its linear shape on the twelfth and thirteenth. The sub-dorsal stripe is visible from the beginning of the third to the end of the eleventh segment as a greenish-yellow line running between two green ones darker than the ground-colour. At the bottom of the sides along the lateral ridge, commencing on the third segment, and continued round the anal extremity, is a whitish line. Between the dorsal and sub-dorsal stripes, on all the segments from the third to the tenth both inclusive, are faintly paler oblique lines of yellow-green, viz., one on each segment sloping downwards and backwards; the warts on the twelfth segment are very often suddenly projected considerably, and then a circle of fine short hairs is visible on their extremities. The surface of the body is also clothed with similar hairs; the head is black, having the base of papillæ and a streak across over the mouth of buff colour. They had all turned to chrysalids by the 24th of June, one of them slightly attached to a stem of the plant by the anal extremity, and lying like the others, amongst a few loose threads at the very bottom of the stems, and partly in the earth. The CHRYSALIS is about five lines long, smooth but without polish, the top of the head slightly projecting, the thorax rounded, the body plump, curving on the back outwards and backwards towards the tip, which is hidden in the caterpillar skin; the wing-cases are prominent and long in proportion; it is of a dull green tint, with a dark brown dorsal line of arrow-head marks."—*Buckler.*

TIME OF APPEARANCE.—From the beginning to the third week in July.

LOCALITIES.—It seems to be one of those species which, from their inconspicuous character, are very likely to be overlooked; and hence its range is very imperfectly ascertained. I have repeatedly taken it in Herefordshire when eager to net every blue, in the hope of securing *Acis*, and have thus obtained a knowledge of its presence. In Ireland it is reported by Mr. Birchall from the Murrough of Wicklow, and from near Ross Trevor. My correspondents resident in Ireland have not

mentioned it. It has not been reported from the Isle of Man, but has been taken in Scotland. Dr. Buchanan White says it has been taken once, by Mr. D. P. Morison, near Pitlochrie in Perthshire. In England its range is extensive, but, apparently from the cause above stated, capricious.

Cambridgeshire. It occurs in several places —*F. Bond.*

Cheshire. Delamere Forest—*Noah Greening.*

Devonshire. Torquay, Teignmouth, Bovey Tracy, Axminster—*J. J. Reading.*

Dorsetshire. Parley Heath in plenty, Blandford racecourse, Portland amongst rocks—there is no heath near—*J. C. Dale.*

Durham. Very common at Darlington—*J. Sang.*

Essex. Very common on a piece of dry ground along the side of the road near High Beech—*W. J. Argent;* the late Edward Doubleday, R. Mendola, and many others have taken *Ægon* at this place.

Glamorganshire. Scarce at Llantrissant—*Evan John.*

Gloucestershire. Rare at Clifton—*A. E. Hudd.*

Hampshire. Portsdown—*W. Buckler;* New Forest—*F. Bond;* Woolmer Forest—*C. G. Barrett;* common but local about Ringwood—*G. B. Corbin;* Sheep Wash, near Petersfield—*Henry Moncreaff.*

Herefordshire. Ascent of the Black Mountain and elsewhere—*E. Newman.*

Huntingdon. Monk's Wood and other woods—*F. Bond.*

Kent. Tunbridge Wells Common, tolerably plentiful—*G. H. Raynor;* swarming near Frant Forest, Tunbridge Wells—*H. Ramsay Cox;* Darent and Birch Woods—*W. Machin;* abundant on all the chalk downs of the coast district—*W. O. Hammond.*

Lancashire. Near Manchester—*R. S. Eddleston;* common on Chat Moss, South Lancashire. It used formerly to occur on Solwick Moss, near Preston—*J. B. Hodgkinson.*

Lincolnshire. Occurs in the county—*T. H. Allis.*

Middlesex. Scratch Wood—*F. Bond.*

Monmouthshire. Common at Castle-y-Bwch—*George Lock.*

Norfolk. Stratton Strawless—*C. G. Barrett.*

Northamptonshire. Barnwell Wold—*F. Bond;* near Towcester—*Hamlet Clark.*

Somersetshire. Brockley, &c.—*A. E. Hudd.*

Staffordshire. Very rare at Wolverhampton —*F. E. Morris.*

Suffolk. Hemingfleet Heath—*W. M. Cromfoot;* Sudbury—*W. D. King.*

Surrey. Hindhead, Witley, Milford—*C. G. Barrett.*

Sussex. Rogate Common—*W. Buckler.*

Warwickshire. Coleshill Park and neighbourhood; also Sutton Park—*F. Enoch;* Rugby—*G. B. Longstaff.*

Westmoreland. Witherslack, Faraway Moss —*J. B. Hodgkinson.*

Wight, Isle of. Hampstead, near Yarmouth—*F. Bond;* Newport—*Alfred Owen;* taken in marshy places in the island; perhaps common, but local—*James Pristo.*

Obs.—As in the instance of the Marsh Ringlet, at page 97, a preliminary note seems desirable in introducing the butterfly which stands next on my list. To this butterfly the names of *Medon*, *Agestis*, *Idas*, *Artaxerxes*, and *Salmacis*, have been successively applied: the first, second, and third of these names appear to be strictly synonymous; the fourth and fifth were given under the apprehension that the phases or races so named were specifically distinct, not only from that which was originally named *Medon*, but also from each other. At the risk of being considered tedious I will enter a little more into detail. *First*, the butterfly figured by Esper as *Medon*, in 1777, appears identical with that figured by Lewin as *Idas*, in 1795; and I believe that the figure of *Agestis* in Hubner represents the same insect. This, which I take as the type, is almost ubiquitous in Great Britain. *Secondly*, the *Hesperia Artaxerxes* of Fabricius is identical with the *Papilio Artaxerxes* of Lewin and Haworth, and is a Scotch insect very different in appearance from *Medon*. And, *thirdly*, the *Polyommatus Salmacis* of Stephens, a butterfly

which seemed to combine the characters of the other two, and its geographical position, the county of Durham, was intermediate between them. Until the publication of this third species, or supposed species, no doubt appears to have been expressed of the distinctness of the other two. But when a new species of insect is discovered, which in its general characters is intermediate between two old ones in colouration, ornamentation, and geographical position, an opinion—perhaps I should say, a suspicion—will arise that the intermediate species connects the other two, and that the three constitute but a single species. I scarcely know whether such an opinion was immediately made public, but still the question appears to have been discussed, since Mr. Wailes, a gentleman of profound observation and research, believed it incumbent on him to defend the newly-proposed species, which he did at page 42 of the first volume of the "Entomological Magazine," in these words:—*Polyommatus Salmacis*—I entirely coincide with Mr. Stephens in considering this a distinct species." This opinion, or rather decision, was received with great deference, and was justly regarded as one of importance, since it must be evident that the existence of a distinct species intermediate between two other species was an *a priori* argument in favour of the perfect distinctness of those other species. Mr. Dale was, I believe, the first entomologist who expressed a decided opinion adverse to the claims of *Salmacis* as a distinct species. At page 357 of the first volume of the "Entomological Magazine," Mr. Dale writes thus:—"*P. Salmacis*, or *Titus*, is intermediate between *Agestis* and *Artaxerxes*; in Scotland none of the *Agestis* are to be found, they are all *Artaxerxes*; in the south none of the *Artaxerxes* are to be found, they are all *Agestis*. At Newcastle they appear to be mules, or hybrids between the two species, partaking in some degree of the characters of both; some of the varieties have a black spot inside the white one on the upper surface of the first wings." This was published in 1832; and in the January of 1834, after having devoted much time and attention to Mr. Dale's opinion, as expressed above, I published an opinion of my own, which went perhaps rather further than Mr. Dale's in the same direction. I stated, that "having examined specimens of *Polyommatus Agestis* from different localities, I have arrived at a conclusion which will not, I fear, be coincided in by many of our lepidopterists. On the south downs of Sussex and Kent *Agestis* assumes what may be called its typical form. I have taken it at Ramsgate, Dover, Hythe, Hastings, Rye, Brighton, Worthing, Littlehampton, Chichester, and Portsmouth; in the Isle of Wight, in Dorsetshire, and in Somersetshire; and throughout this range it is very similar: then, going northwards, I have met with it at Worcester, Leominster, Birmingham, and Shrewsbury—and here an evident change has taken place: the band of rust coloured spots has become less bright: at Manchester these spots have left the upper wing almost entirely: at Castle Eden Dene they are scarcely to be traced, and a black spot in the centre of the upper wing becomes fringed with white; in some specimens it is quite white, as shown at page 126: it then changes its name to *Salmacis*. We proceed farther northwards, and the black pupil leaves the eyes on the under side, until at Edinburgh they are quite gone, then it is called *Artaxerxes*. The conclusion I arrive at is this: that *Medon*, *Salmacis*, and *Artaxerxes* are nothing more than geographical races of one species." Mr. Wailes, in his admirable "Catalogue of the Lepidoptera of Northumberland and Durham," seems to think this conclusion erroneous, for he says "Mr. Newman, in the second volume of the 'Entomological Magazine,' advanced an opinion that all three were one, though I certainly think on insufficient grounds."—P. 217. Mr. Wailes then goes very carefully over the ground, and after five pages of lucid and elaborate reasoning, he arrives at the following conclusion:—"From all these facts and circumstances I think I am justified in uniting the three forms under the single name of *Medon*."—P. 223. Thus Mr. Wailes seems to retract his original opinion, and to arrive at the same terminus as myself, by a line of his own construction—an issue

of the inquiry peculiarly agreeable to me, because it evinces perfect independence of thought. At page 57 of the "Annual Report and Transactions of the Plymouth Institution," Mr. Reading, the eminent Plymouth naturalist, after considering the question in all its bearings, disposes of it thus: "A careful comparison of the forms of the imago long since convinced me that *Lycæna Medon*, *Salmacis*, and *Artaxerxes* were forms of one species." My own opinion as originally expressed remains unaltered, but I conceive that such an opinion by no means dispenses with the necessity of distinguishing the three phases as clearly as I am able. I shall, therefore, describe each phase, race, or variety separately, as I have done in the case of *Davus* and *Rothtiebii*, being satisfied that I have done my duty in expressing without urging my opinion, that the three phases constitute but a single species.



The upper figure represents *Medon*, the second *Salmacis* (male), and the lower *Artaxerxes*

41. Brown Argus.—All the wings are dark sepia-brown on the upper side, the fore wings having a median, linear, transverse, obscure, discoidal black spot, and all the wings having a series of orange-brown spots parallel with the hind margin; the fringe is spotted. The under side is slatey-gray in the males, fulvous-brown in the females, with seven black spots in the fore wings and eleven in the hind wings, all of them having a white circumscription; there is also a series of orange-red spots parallel with the hind margin of all the wings. Each of these is connected with a crescentic black spot above and an amorphous black spot below; it is also enclosed in an imperfectly-defined white circumscription; below the middle of the wing, and extending towards the hind marginal series of compound spots, is a vague and indistinctly-defined sub-median white blotch.

Obs.—The specific name of *Medon* for the Brown Argus was given by Hufnagel in 1774, and has been adopted by Esper and Continental entomologists generally, but not by our countryman Lewin, who believed it identical with the *Papilio Idas* of Linnæus, nor by Haworth, who calls it *Idas*, although perfectly aware that the *Idas* of Linnæus was the female of the Common Blue. Mr. Stephens changed the name to *Agestis*, evidently on the supposed ground of priority; but I think this also a mistake, and revert to the earliest name.

Life History.—At page 6211 of the "Zoologist" for 1858, Mr. H. J. Harding says:—"I discovered the caterpillar of *Medon* about eight years ago, and have taken it every year when on the Deal coast. . . . It is found on and under the hemlock storksbill (*Erodium cicutarium*), which grows here in large patches or beds in many places apart from other herbage; and it is from this cause that the caterpillars are so easily found: having no legs, like many other caterpillars, they cannot feed on the tops, but on pulling aside the branches of the storksbill, the caterpillars are found on the sand beneath them." Having received some of the caterpillars in question, and others having been sent to Mr. Logan, I believe we both immediately arrived at the conclusion that they were the caterpillars of a beetle. Such was certainly the case in some instances, as fully established by rearing the perfect beetle from them, both in Edinburgh and in London; and such an inference might fairly be drawn from Mr. Harding's description, "having no legs." The truth of

the theory was abundantly proved by the sequel, for the caterpillars produced a beautiful weevil (*Hypera fasciculata*); nevertheless, I am quite prepared to admit that the caterpillars of *Medon* were probably present in company with those of the weevil, and that Mr. Harding piloted the way to the discovery of the life history of this species. The reader who feels an interest in this question, and has leisure to do so, is recommended to read the controversy on this subject in the volume of the "Zoologist," from which I have already quoted, pp. 6211, 6246, 6248, 6270, 6277, 6278, and 6310. In quoting Professor Zeller's account of this insect, from page 73 of No. 40 of the "Entomologists' Monthly Magazine," I would invite attention to the fact that this truly eminent entomologist was on the very eve of repeating Mr. Harding's mistake as to the caterpillar of a beetle. "After several attempts, which I made in the beginning of the summer of last year, to observe the female whilst ovipositing, and which, from the state of the weather, were always fruitless, I at last succeeded on the 22nd of August. A female settled on a fallow field on the bare ground. Having observed in her vicinity some seedling plants of the storksbill, I did not disturb her; consequently, I saw how she approached towards one of these plants, and, after a short rest, curved her abdomen, and deposited an egg on the under side of a leaf; having done this, she flew away. This EGG had the ordinary form of those of the genus *Lycæna;* it was greenish-white, and retained this colour till the 31st August, when it became pure white, and had on its upper side a large kidney-shaped hole, through which the caterpillar had escaped. The plant with the egg I had fastened with a pin to a larger plant in a flower-pot, so that it should not dry up. Suspecting that more eggs had probably been deposited in the same locality, I revisited the place on the 5th September, and cut off about a hundred plants (which were now rather larger) close above the roots, without shaking them, and placed them in a pocket-handkerchief. On the following day, when they were becoming rather withered, I shook them out, and, in addition to sundry green aphides, and some caterpillars and chrysalids of *Syrphus*, I obtained eighteen onisciform caterpillars. These were from one to two lines long, dull pale greenish, with rather long white hairs, the lateral margins rather paler, the head black. They remained half an hour or longer before they crawled away from the spot where I had placed them; they repaired to the under side of the leaves, and ate during the sunshine the tips of the primate leaves, leaving only the upper skin remaining, which soon curled up and withered. On the 11th September, I tried the same plan of operations on a sunny slope, where the butterfly had not been scarce in the spring. Here I found what I took for the full-grown caterpillar, only I was struck by its shape being so slightly onisciform, since the body was narrow and gradually attenuated behind. The largest were pale green, with the head honey-yellow, spotted with black; a pale rose-coloured dorsal stripe on each segment, an elongate black spot on each side; beneath the black spiracles ran a wavy pale red longitudinal stripe; the prothorax was yellowish. Yet I supposed this to be the *Medon* caterpillar I was seeking, till I observed the following day that it had no anterior legs: I believe it was the caterpillar of one of the *Curculionidæ*. As they were eating up my food unnecessarily, and I did not feel certain that they might not be disposed to make a meal of one of my true *Medon* caterpillars, I turned them away altogether. I had, however, amongst them truly obtained some caterpillars of *Medon*. By a third expedition I increased my stock to more than fifty, so that now there seemed good hopes of bringing some safely through the perils of winter. I distributed them into three flower-pots; but I had great difficulty with the food-plants, since the young plants died quite as soon as the old ones planted with injured roots. At the same time, the caterpillars grew very slowly; however, by degrees, they assumed the colouring and markings of the adult caterpillar. Early in December, when frost set in, I arranged the three flower-pots for the winter: two, covered with gauze, were

placed outside a window facing north, and the other, quite uncovered, stood in a cold room. From time to time I watered the plants to keep them alive. On the 14th February I searched for the caterpillars which had survived the winter, in order to put them again in the sunshine. In the flower-pots which had been exposed to the open air I found both the plants and caterpillars dead; in the third flower-pot I found fifteen caterpillars of rather different sizes: they had remained motionless the whole time, either on the stems of grass, or on or under living leaves of storksbill. As I had not spared anything necessary for their rearing I come to the conclusion that the reason the females are so fruitful in autumn is that many caterpillars may be destroyed during the winter without injury to the species; and that this is truly the case seems to be shown from the fact, that the multitude of caterpillars which are to be found in autumn does not at all correspond to the number of butterflies of *Medon* which appear in spring. Supplied with fresh food, which would probably suit their taste, in the sunny window, my caterpillars cast their skins several times. Although I could not make any precise observations, yet it is certain that the number of moultings does not differ from what occurs in other species of *Lycæna*. Of the fifteen caterpillars, seven died by degrees. One, just dead, which I described on the 14th March, was already nearly five lines long. Its shining black head had a gray face; the body was pale green, with a deep, rather narrow, posteriorly attenuated, dark red medio-dorsal stripe. The warts near it on each segment, with about twelve unequally long, pointed, pale bristles, which, on the anterior segments, stand almost perpendicularly, on the middle and hinder segments are directed more backwards. I could not perceive that these caterpillars had a cone capable of being protruded (like that which we find in *Lycæna Corydon*, and which the ants are so fond of licking). The legs are black; the claspers of the same colour as the pale belly, which, on each segment from the fourth, has on each side a black streak reaching to the lateral wart; these streaks, however, are not perceptible in the living caterpillar. The red lateral stripe is as usual Having planted three vigorous plants, the remaining caterpillars prospered so well that, by the 8th April, I could look upon them as full grown, or nearly. They devoured the primate leaves, gnawed the stem of the leaf, hence causing the upper part to wither, and did not spare the young shoots, when the plants assumed at last a very injured appearance, and were abundantly sprinkled with grains of brown-green excrement. The caterpillars crawl very slowly, whilst they spin a white thread, which they fasten to the right and left, and on which they fix their legs. They are not easily seen on the food-plant, since they are the same shade of green, and even their bristles have the same colour as the hairs on the leaf-stalk.

"The full-grown CATERPILLAR is six lines and a half in length. Its body is much arched, and so contractile that the creature can appear a line and a half shorter, whereby it naturally becomes more deeply arched. The retractile black head has a whitish transverse streak above the mouth; the dark palpi are whitish at the base. The ground colour of the body is an agreeable pale green; the deeply-seated, brownish-purple coloured medio-dorsal stripe reaches from the beginning of the mesothorax to the beginning of the penultimate segment; the rather flat anal plate is semi-oval, and in the middle of each side slightly concave. On each side of the body from above, obliquely downwards and backwards, are faint pale stripes, only just perceptible, and in many points of view quite invisible. The incisions of the segments are deep above, whereby on each segment near the dorsal line an eminence arises, which bears a multitude of white bristles of unequal length, almost radiating. Below this wart-like eminence is a second, less conspicuous, with similar bristles. Both eminences have hollows in the middle, which the caterpillar can raise or depress at will. The lateral wart, clothed with longer projecting bristles, in which the spiracle is not perceptible, is purple-red, and forms the rather

broad lateral stripe, which, however, does not reach the head, since the prothorax is either altogether green at the sides, or is only pale reddish posteriorly. The anal plate is purple-coloured only for a narrow space anteriorly at the sides. The belly is pale green, with many whitish bristles. The claspers are short, pale yellowish, rather transparent, with short cylindrical feet, with a darker yellowish circlet of hooks; the legs are spotted with black anteriorly. When the time of pupation approaches, the caterpillar becomes of a paler green, and crawls about restlessly to seek a place for spinning. As I once lost the caterpillars of *Lycæna Amyntas* at this period of their lives, because they could find no place suitable for their change, I laid crumpled paper, gauze, dry elm and poplar leaves, and old stalks of wormwood, amongst the plants of storksbill. As, however, with the caterpillar which first became restless all this appeared of no avail, I shut up the two most bleached and shrunk in a small wooden box, in which both gauze and paper lay. Here, after five or six days, they became quiet, and changed to chrysalids without spinning. The others in the flower-pot changed on the earth, nearly free. I had almost come to the conclusion that spinning in *Medon* is altogether omitted; however, two spun up quite in the usual *Lycæna* style, on a white silken web, and with a thread round the body; one of these was in the cavity of an old elm leaf, the other on a willow leaf, ,between stems of *Artemisia*, which it had drawn together with some transverse threads, forming as it were the rudiments of a cocoon. By the 28th of April all the eight had assumed the chrysalis state. Out-of-doors the caterpillars, owing to the hitherto inclement weather, were certainly not so far advanced. The CHRYSALIS has the usual *Lycæna* form, is from four to five lines long, the males smaller and more slender than the females, naked, only at the head and on the upper part of the back with isolated, very short whitish bristles, only perceptible with the aid of a lens; the colour is rather transparent pale amber, more or less greenish, with slight lustre: the opaque body is more of a pale yellow. Over the eye is a short curved, shining black line. The convex thorax is separated from the equally convex back of the body by a saddle-like depression. The body has a dorsal stripe of reddish-purple, more or less brilliant, and a similar lateral stripe of different breadth, which also shows through the upper margin of the wing-cover. The anal extremity, which is concealed in the empty skin of the caterpillar, is obtuse, rounded, and without spines or bristles. It is immovable, and is held fast by a fine white thread, which is drawn round the base of the body, and by the exuvia, on its silken couch. The exclusion of the butterfly takes place according to the temperature, in from two to three weeks."—*Zeller.*

TIME OF APPEARANCE.—The butterfly appears twice in the year, in May and August.

LOCALITIES.—Mr. Birchall informs us that this species is taken at Dundrum, near Dublin; there is no record of its occurrence in the Isle of Man or in Scotland. In England it is widely, and, I may say, generally distributed, but does not occur in the lists transmitted me from Berkshire, Cumberland, Cheshire, Middlesex, or Shropshire.



Castle Eden Argus (*Lycæna Salmacis*). Female.

CASTLE EDEN ARGUS.—"Wings brown-black; beneath brownish, with subocellated spots: fore wings above with a discoidal black spot in the male, a white spot in the female: hind wings with a red sub-marginal band on both sides."—*Stephens.*

Obs.—Having already expressed my opinion as to the insect not having a claim to be ranked as a species, and feeling quite incompetent to differentiate this supposed species from those which immediately precede and follow it, I hold myself excused from writing a description from nature, and adopt without alteration that published by my late lamented

friend. The original specimens, six in number, from which the descriptions were made, are in the British Museum; five of them have no discoidal white spot; one has the white spot decided and distinct; four have an indistinct discoidal linear black spot; all have an indication of a series of orange spots parallel with the hind margin; in one specimen this series is complete on all the wings; the only specimen showing the under side has a black pupil in all the white spots.

LIFE HISTORY.—Unknown.

TIME OF APPEARANCE.—One brood only; the butterfly on the wing from the latter end of June to the latter end of July.

LOCALITY.—Castle Eden Dene, in the county of Durham. This species appears confined to the sea-banks, and I have never seen it above half a mile from the coast, and only stragglers at that distance—*George Wailes.*

Scotch Brown Argus (*Lycæna Artaxerxes*).

SCOTCH BROWN ARGUS.—All the wings dark sepia-brown on the upper side, with a white discoidal spot on the upper wings, and an indication of a series of rust-coloured spots parallel with the hind margin of the hind wings; the fringe is spotted. The under side is slatey-gray in the males, fulvous-gray in the females: in both sexes there are seven white spots on the fore wings, and eleven on the hind wings: there is also a series of reddish spots parallel with the hind margin of all the wings, each of which is connected with a crescentic black spot above and an amorphous black spot below: between the middle of the wing and the hind-marginal series of compound spots is a sub-median white blotch, often amalgamated with other white spots.

Variety.—With a white discoidal spot on upper side of each hind wing.

LIFE HISTORY.—Mr. Young, of Edinburgh, describes the EGGS of *Artaxerxes* as circular, flattened, covered with small granulations, except at the apex, and of a greenish-white colour: they hatched in fourteen days, and the young caterpillars were very delicate, of a semi-transparent white colour, with a black head, and numerous long white hairs: they preferred the leaves of the scarlet geranium to those of the sun cistus. Mr. Logan, Mr. Buckler, and Professor Zeller, have given lengthened descriptions of the caterpillar in a more advanced state. I select Mr. Buckler's, which is written from specimens sent him by Mr. Doubleday, and is published at page 176 of No. 55 of the "Entomologists' Monthly Magazine." "The CATERPILLAR," says Mr. Buckler, "is of the usual *Lycæna* shape, somewhat onisciform, short and thick, being arched on the back and sloping on the sides; the spiracular region is swollen, and projecting laterally much beyond the claspers; the segments appear deeply divided, especially on the back, down which are two rows of rather peaked cone-like eminences, with a dorsal hollow between them; the second segment is simply rounded above, and rather longer than the others, and tapering a little near the head, which is very small and retractile; the anal segment tapers very little, is rounded behind, and hollowed above on the sides; the twelfth segment has a small and prominent wart on each side. The half-grown caterpillar is from three to four lines in length-pale green in colour, and clothed with very fine and short whitish bristles; the mediodorsal stripe, beginning on the fourth and ending on the twelfth segment, is of a faint brown colour, though wider and more strongly marked just at the beginning of each segment, and widest at its termination on the penultimate. On the sides of the segments, from the fifth to the tenth, are double oblique lines, slanting backwards and downwards, of paler, green in front and darker green behind than that of the ground colour. At this stage of growth the natural projecting ridge of swellings is broadly pink, with scarcely an indication of a central paler stripe; the belly and ventral claspers are pale yellowish green; the legs flesh colour. The head is black, the base of the papillæ flesh-colour, and there is a streak of the same before the mouth. On approaching full growth its length is about half an inch; the oblique lines gradually disappear, and the green colour becomes rather darker; a pinkish white stripe runs along the natural

prominences, broadly bordered above by a stripe of rose-pink, and beneath by a broader stripe of still darker pink; the spiracles are flesh-colour, situated in the upper pink stripe, very minute and inconspicuous. The claspers are green, and the legs pinkish, spotted with brown. These caterpillars were fed on the common sun-cistus (*Helianthemum vulgare*), and two of them changed to the chrysalis state on the 21st of May, and a third a week later, all in nearly perpendicular positions, amongst and slightly attached to the stems of the food-plant by a few silk threads near the ground. The CHRYSALIS is about four lines in length, smooth, and without polish, rather thick in proportion; the head rounded and prominent; the thorax rounded above, the body plump, and curved a little backwards; its extremity being hidden in the shrivelled skin of the caterpillar, which adheres to it: the colour of the head and wing-cases is blue-green, with a black curved streak obliquely placed on each side of the head; the body is yellowish flesh-colour, with a deep pink stripe at the sides enclosing a central white one, which can also be seen showing through part of the wing covers."—*Buckler.*

TIME OF APPEARANCE.—In 1858, on the 19th of June; in 1859, on the 27th of June; in 1860, on the 30th of June; in 1864, on the 13th of June; in 1865, on the 1st of July; in 1867, on the 27th of June.—*F. Buchanan White.*

LOCALITIES. — Unknown in Ireland, England, or the Isle of Man: in Scotland it is generally distributed. Dr. Buchanan White says it occurs everywhere in Perthshire where the sun-cistus grows. Even in Rannoch, where the plant is scarce, he saw specimens of the butterfly. It has been recorded from as far north as Aberdeenshire. Dr. Syme says it is local but abundant on Orrock Hill, and has occurred in other places near Balmuto. I have seen it in some abundance on Arthur's Seat, near Edinburgh, which is the original locality. Mr. Birchall finds it in Ayrshire.

42. COMMON BLUE.—The upper side of all the wings is delicate lilac blue in the males; dingy brown, more or less glossed with lilac blue reflections, in the females, and having a



42. Common Blue (*Lycæna Icarus*). Upper and under sides.

more or less indistinct series of orange spots parallel with the hind margin; in this sex there is also a transversely linear, but indistinct, black discoidal spot on the fore wings; the fringe is white. The under side of all the wings is ashy-gray in the males, fulvous-brown in the females: in both sexes there is a hind-marginal series of compound spots, which are rather indistinct in the males, but very distinct in the females; the marginal portion of each spot is white, and contains a transverse black mark; then follows an orange blotch, then a black crescent, and then a white crescent: the disk of each fore wing



Two varieties of the under side in the cabinet of Mr. Bond.

has nine, and that of each hind wing thirteen, black spots, each spot having a white circum-

scription; below the middle of the wing, and extending towards the hind-marginal series of compound spots, is a vague and indistinct submedian white blotch.

Varieties.—The varieties of the upper side are rather puzzling, owing to the greater or less preponderance of the blue tint in the females; the males, on the contrary, are almost uniformly blue. The under side is subject to occasional variation, owing to the combination and enlargement of the spots. Two beautiful specimens, illustrating this peculiarity, have been kindly lent me by Mr. Bond purposely for this work, and are figured on the preceding page.

Obs.—The specific name of *Icarus* for the Common Blue dates 1774, and has been adopted by Esper, and by our countrymen Lewin and Haworth. Modern English nomenclature has changed the name to *Alexis*, but I think without sufficient reason, although this also is an early name, having been proposed in 1776.

Life History.—The eggs are laid on rest-harrow (*Ononis spinosa*), and the young caterpillars, when they emerge, feed on the leaves of this plant, on which they may be found resting much after the manner of a *Chiton*, a shell which in form they somewhat resemble. The head is very small, glabrous, oblong, porrected in crawling, but otherwise withdrawn into the second segment and totally concealed; the body is convex above, flattened below, rounded at both extremities, and dilated and lobed at the sides; the divisions of the segments are conspicuously marked; the spiracles are situated considerably above the lateral margin, so much so that they might be called sub-dorsal; the posterior pair are decidedly dorsal; the whole surface is covered with extremely minute warts, each of which emits a hair. The colour of the head is intensely black, of the body green—sometimes bright apple-green, at other times dull olive-green; there is a medio-dorsal stripe rather darker, and a narrow lateral stripe below the spiracles, but above the lateral lobes, much paler, almost white; between the dorsal and lateral stripes there are, on each side of each segment, three pale oblique lines, their inclination being from the anterior to the posterior margin of the segment; the minute warts are black; the legs, claspers, and ventral surface are of the same green hue as the body. Towards the end of July it undergoes the transformation to a chrysalis, which is rounded at both extremities, and is without angles; the anal extremity is without the usual minute hooks for attachment; the region about the head is furnished with minute bristles; the colour is dull green; the head, extremity of wing-cases, and ventral surface of abdomen are tinged with brown.—*Newman.*

Time of Appearance.—Throughout the summer from May to October, perhaps more particularly abundant in May and June.

Localities.—Mr. Birchall says it is common everywhere in Ireland; he also reports it from the Isle of Man. In Scotland it is particularly large and brilliant. The specimens brought from Rannoch by Mr. Thomas Eedle are the largest I have ever seen; so intense is the blue of the males, that I could not avoid thinking it was another species, but Mr. Doubleday pronounces it identical with our English species. Dr. Buchanan White says that its range in Scotland extends from the sea-level up to a considerable elevation in the mountains. In England it is everywhere, except in a few localities in Yorkshire: I believe it has escaped the notice of the Halifax entomologists.



43.—Clifden Blue (*Lycæna Adonis*). Upper side of Male.

43. Clifden Blue.—On the upper side all the wings of the male are of the most beautiful shining blue, with a slender white line on the costal margin of the fore wings, and a slender black line on the hind margin; this black line passes round the tip of the wing beneath the white line, but vanishes at about half the

length of the costa. The wing-rays are black towards the hind margin; the fringe is snowy white, with a black spot opposite the end of every wing-ray—that is, five in the fore wings and seven in the hind wings. The upper side in the female is smoky brown, occasionally with blue reflections, and having a series of spots, more or less distinct, parallel with the hind margin; these spots have a somewhat compound character, the upper border being orange, the centre black, and the lower border white; on the fore wings is a transverse linear discoidal spot, black with whitish margin, but always faint and indistinct. The under side is grayish brown in both sexes; all the wings have a transverse median discoidal spot in the fore wings; this is black with white circumscription; in the hind wings it is white, with a very slender black median line; on the fore wings are nine other black spots, and on the hind wings eleven, all of which have a white circumscription; there is also a series of compound spots parallel with the hind margin; the centre of each is orange, with a black mark above and below the orange, and a white circumscription; a submedian shapeless white blotch extends from near the middle of the hind wing nearly to its hind margin.

Life History.—Fabricius describes the caterpillar as of a green colour, and as having dorsal series of fulvous spots. Freyer somewhat improves this brief description, by fixing the number of spots at twelve in each series, of which there are two; and adds that there is a yellow stripe on each side. It feeds on leguminous plants. I regret my inability to give any more information respecting an insect that is in every collection.

Time of Appearance. — I have never found the caterpillar or chrysalis. The perfect insect is on the wing in May or June.

Localities.—Unknown in Ireland, Scotland, or the Isle of Man. In England it is a southern species, and almost peculiar to the chalk. I give a few localities.

Buckinghamshire. Drayton Beauchamp—*H. H. Crewe;* Halton—*Joseph Greene.*

Devonshire. On the chalk and limestone formations, but not in the Plymouth district; Torquay; common at Chapel Hill and Anstey's Cove; Seaton; Sidmouth—*J. J. Reading.*

Dorsetshire. Knowle Hill, Buckland Newton, Portland, Lulworth, Blandford Racecourse—*J. C. Dale.*

Gloucestershire. Scarce at Wootton-under-Edge, but occurred there in 1861, 1865, and 1869—*V. R. Perkins;* taken in the gully at Durdham Downs in 1868, but not reported since—*W. H. Grigg;* Clifton—*Alfred E. Hudd.*

Hampshire. Near Winchester—*J. C. Dale.*

Kent. In profusion about Dover Castle and all the hollows at Folkestone—*H. Ramsay Cox;* not uncommon—*G. H. Raynor;* Chilham Park and Dane Court, near Chilham—*H. A. Stowell;* in chalky lanes and railway cuttings, local but abundant—*W. O. Hammond;* lane leading from Dartford to Darenth —thousands have been taken in this and some neighbouring localities for the unworthy purpose of making butterfly pictures.—*E. Newman.*

Surrey. Abundant at Mickleham, and on the chalk downs about Guildford, and on the south side of the Hog's Back—*E. Newman.*

Sussex. Malling Hill, Bible Bottom, East Dean, &c., abundant—*E. Jenner;* Hollingbury Coombe—*W. Buckler;* Beeching Chalk-pit at end of May, and again in August, plentifully—*J. H. White;* plentiful near Lewes, on chalk—*C. V. C. Levett;* downs near Brighton—*W. H. Draper.*

Wight, Isle of. Ventnor, Apse Down, Freshwater, generally distributed on the downs—*F. Bond;* common in places on the chalk, as near Carisbrook Castle, &c.—*J. Pristo;* St. Boniface Down—*J. C. Dale.*

44. Chalk-hill Blue.—In the male the wings are of a pale silvery blue, gradually shading off to smoky black towards the hind margin, where the black forms a hind-marginal band in the fore wings; there is a slender white line along the costal margin, and within this is a black line not very distinct or clearly defined; the wing-cases also are black towards the margin: in the

hind wings is a series of black spots parallel with the hind margin; these alternate with the wing-rays: in the female the wings are pale smoky brown, with a very indistinct, median, transverse, linear, black spot, and also a series of obscure spots parallel with the hind margin: in the hind wings these spots



44.—Chalk-hill Blue (*Lycæna Corydon*). Male and Female.

have a compound character—orange above, black in the middle, and white below; the fringe is spotted. The under side is gray in the males, gray-brown in the females; all the wings have a transverse median discoidal spot; in the fore wings this is black with a white circumscription; in the hind wings it is white with a very slender black median line: on the fore wings are nine other black spots, and on the hind wings eleven, all of which have a white circumscription: there is also a series of compound spots parallel with the hind margin; these are black, orange, and white; and a sub-median white blotch between the middle of the wing and the hind-marginal series of compound spots.

Obs.—I regret the necessity of acknowledging my inability to differentiate perspicuously the females of *Adonis* and *Corydon*.

Life History.—The caterpillar rests in a flat position on its food-plant, with the ventral surface appressed to the leaves, and its head, legs, and claspers concealed: if annoyed it will fall to the ground, with both extremities slightly incurved; but the anterior extremity most so; the head is almost globular, but rather produced towards the mouth; it is about one-third as wide as the second segment, and entirely retractile within that segment; the body is woodlouse-shaped, and in crawling, as in resting, both the head and legs are concealed; the divisions of the segments are decidedly marked: on the back is a double dorsal row of eight approximate humps, two on each segment from the third to the tenth, both inclusive; the margin of the body is dilated all round, and this greatly contributes to the woodlouse appearance of the caterpillar; the surface of the body is finely shagreened, and sprinkled over with black dots, each of which emits a short but rigid bristle; the surface of the caterpillar in this respect closely resembles the glandular surface of the stems and leaves of some plants: these gland-like bristles are particularly observable on the dilated lateral margin: the legs and claspers form a double medio-ventral series. The colour of the head is dark brown, almost black, and highly glabrous; the body is dull opaque green, with six longitudinal series of oblong gamboge-yellow spots; two of these series are dorsal and approximate, and each series consists of eight such spots; the direction of the spots is rather oblique, and the anterior extremity of each is rather narrowed; these dorsal spots occupy the summits of the humps already described; another series of very similar yellow spots is marginal, occupying the lateral dilatation of each segment, and above this marginal series of yellow spots are the circular and rather conspicuous spiracles; in the two remaining series the yellow markings are linear and ventral, and equidistant between the claspers and dilated margin. It feeds on various papilionaceous plants, as bird's-foot trefoil (*Lotus corniculatus*), kidney vetch (*Anthyllis vulneraria*), and trefoil (*Trifolium*). On or about the 13th of June these caterpillars changed to chrysalids, at the bottom of the glass wherein they were confined, without attaching themselves in the

slightest manner to the food-plant or any other substance: the CHRYSALIS is rounded and without projecting points or angles; the extremities are obtuse: it is covered with short hairs, which, however, are not apparent without the use of a lens; its colour is a pale, dingy, greenish brown, and the cases which envelope the thoracic segments and wings have a semi-transparent appearance.—*Newman.*

TIME OF APPEARANCE.—End of May, the whole of June, and the beginning of July.

LOCALITIES.—It appears to be abundant everywhere in England on chalk, but generally absent where there is no chalk. Mr. Birchall did not meet with it in Ireland or the Isle of Man, and I know of no record of its occurrence in Scotland. In the south of England it is comparatively common. I subjoin a few localities.

Berkshire. Burghfield, near Reading: I mention this, not on account of the rarity of the insect, but because there is no chalk near —*C. S. Bird.*

Buckinghamshire. Drayton-Beauchamp, Buckland, Aston-Clinton—*H. Harpur Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Cherry Hinton; chalk-pits near Cambridge—*F. Bond.*

Cornwall. Railway banks near Terras, Pill, and other places, tolerably abundant: I am rather surprised at its occurrence here, as there is no chalk near—*Stephen Clogg.*

Cumberland. Grisedale, near Saddleback: Mr. Hope, of Penrith, told me he had taken it repeatedly—*J. B. Hodgkinson.*

Dorsetshire. In plenty on the downs near Dorchester, Lulworth, and Hoddhill; a single specimen at Glanville's Wootton—*J. C. Dale.*

Essex. While collecting with the Rev. W. Bull, in the high woods near Colchester, we were astonished to meet with about a dozen specimens of this insect. I had never seen it there before, nor have I found a single specimen since: there is no chalk anywhere in the district, and no marl within three or four miles of the high woods: a specimen or two have occasionally turned up on the railway banks, but it is a great rarity here—*W. H. Harwood;* in the year 1866, when beating autumnal larvæ in Epping Forest, I observed *Corydon* here and there in all the drives through the forest: I caught some half-dozen, and only notice the circumstance on account of the absence of chalk—*E. Newman;* Herne Bay, *H. D. Greville;* Saffron Walden—*W. R. Jeffrey.*

Glamorganshire. Common at St. Bride's, near Bridgend—*Evan John.*

Gloucestershire. It occurs at Wootton-under-Edge, but is not so common as it was formerly; it used to be very abundant—*V. R. Perkins;* common on some parts of the Cotswolds, at Dursley, and near Cheltenham —*Joseph Merrin;* Rodborough Common—*M. G. Musgrave;* Durdham Downs, and Coombe Glen, near Bristol—*F. D. Wheeler;* near Stroud—*W. H. Grigg;* Clifton—*Alfred E. Hudd.*

Hampshire. Portsdown—*W. Buckler;* taken once on heath in the New Forest—*G. B. Corbin;* hill near Winchester—*J. C. Dale.*

Kent. Every Kent list speaks of its abundance in the county: I have seen it by hundreds in the chalky lane leading from Dartford to Darent—*E. Newman.*

Lancashire. Grange—*Alfred Owen;* abundant at Arnside in Silverdale, more especially about Arnside Tower—*J. B. Hodgkinson.*

Lincolnshire. Common in Lincolnshire on chalk—*T. H. Allis.*

Middlesex. Very rare near Whimbley—*F. Bond.*

Somersetshire. Leigh Woods—*A. E. Hudd.*

Surrey. In all parts of Surrey—*S. T. Klein;* Milford, near Godalming—*C. G. Barrett.*

Sussex. Beeching Chalkpit, and near Shanktonbury Ring: plentiful in July—*J. H. White;* plentiful about Lewes—*C. V. C Levett;* everywhere on the South Downs—*E. Newman.*

Westmoreland. Rough Fields, near Beetham and Milnthorpe, in August—*J. B. Hodgkinson.*

Wight, Isle of. Abundant on the chalk—*James Pristo.*

Wiltshire. Glory Ann, Rainscomb Park, near Great Bedwyn—*J. A. Preston.*

Warwickshire. Once at Knowle—*Frederick Enock.*



45.—Mazarine Blue (*Lycæna Acis*). Upper side.



Under side.

45. Mazarine Blue.—The colour of the upper side of the wings is purplish blue, shaded to smoky black at the hind margin; the outer portion of the fringe is white and unspotted. The under side is plain drab, except at the base of the hind wings, and there silvery blue; on the fore wing is a transverse oblong discoidal black spot, exactly half-way between the base and tip of the wing, and again half-way between this and the tip of the wing is a row of five, and sometimes seven, black spots; the hind wings have one black spot near the base, and also near the costal margin; a short black transverse linear discoidal spot in the very middle of the wing, and beyond this a transverse series of black spots, generally eight in number; these spots are nearly circular, and each has a white circumscription.

Obs.—This species has no series of orange or compound spots parallel with the hind margin of the hind wings, and no submedian white blotch.

Life History.—Unknown.

Time of Appearance.—June and July.

Localities.—Unknown in Ireland, Scotland, and the Isle of Man; it is very local in England, occurring here and there in old pastures.

Cambridgeshire. I had the pleasure of capturing here a very good specimen of *Acis* on the 20th of last July, 1858, and one not so good early in August, 1857—*C. Albert Beadan.* "*Intelligencer,*" vol. iv., p. 141; Cherry Hinton and chalk-pits near Cambridge, and Lawston many years ago—*F. Bond;* formerly common in the county, but has not been taken for the last ten years—*Thomas Brown.*

Dorsetshire. Glanville's Wootton, formerly in plenty, but none have been taken since 1841, Powerstock, Parley Copse, Hazlebury—*J. C. Dale.*

Glamorganshire. In 1835, 1836, and 1837 I could take *Acis* in plenty, but have not seen it since—*T. Parry, Merthyr* "*Intelligencer,*" vol. vi., p. 28; Croesgid, near Llantrissant, rare—*Evan John;* I have seen, but not taken, Glamorganshire specimens—*J. T. D. Llewelyn.*

Gloucestershire. Has been met with at Stinchcombe and Break Heart Hills, near Wootton-under-Edge; specimens from these localities are in Mr. Cooper's collection—*V. R. Perkins;* two specimens at Lower Guiting, on the Cotswold, the beginning of July, 1849—*Joseph Greene;* Dursley—*Evan John, Alfred E. Hudd.*

Hampshire. Near Ringwood, and near Brockenhurst—*J. C. Dale.*

Herefordshire. I took five specimens in one of my father's meadows, called the "Horse Leasow," at Olden Barn, four miles from Leominster, on the 20th June, 1832; four of them were females and one only a male. I have repeatedly seen it since, and my nephew has taken two specimens, but many years ago—*E. Newman.*

Lincolnshire. One specimen was taken at Epworth, in the Isle of Axholm—*T. H. Allis.*

Monmouthshire. I have taken one specimen at St. Julians—*George Lock.*

Somersetshire. I took two or three of these butterflies flying in a pasture-field at the bottom of a hill near Bath; they were much wasted in colour, and appeared to have been long on the wing—*Lewin.*

Warwickshire. *Acis* was formerly taken in plenty near Shirley, but it has not been seen for the last ten years; picture-makers and dealers have exterminated the species—*Frederick Enock.*



16.—Small Blue (*Lycæna Alsus*). Upper side.



Under side.

46. Small Blue.—The colour of the upper side is smoky brown, faintly tinged with silvery blue, an appearance communicated by the presence of scattered metallic scales; the costal margin is white; the fringe has the basal portion brown, the outer portion white. The under side is silvery gray; half-way between the base and tip of the fore wing is a short, linear, transverse, discoidal spot, and again half-way between this and the hind margin is a transverse series of seven black spots; on the hind wings there is the usual median transverse, linear, discoidal spot, and ten other black spots, one of them near the costal margin at its base, another between this and the inner margin, and another near the anal angle; the remaining eight form an irregular transverse median series; all the spots have a distinct pale circumscription.

Obs.—There is no marginal series of orange spots, and the white submedian blotch is also absent.

Life History.—At page 205 of No. 33 of the "Entomologists' Monthly Magazine," Mr. J. Gedge, of Cambridge, gives us the following interesting account of the oviposition of this species:—

"On June 27th, the perfect insect was out in great abundance, so I set to work to discover its food-plant. I soon observed that they did not care much for the great masses of kidney vetch (*Anthyllis vulneraria*), but rather chose to settle upon the scattered flowers of this and other plants. Presently, however, I saw one settle on a flower-head of the kidney vetch which showed no yellow blossoms. I remained perfectly still. It walked down between the flower-buds, and dragged its body between the woolly calyces; all round the flower-head it went, and then turned up its body, and flew off to another head. Here there were two or three blossoms just open, but it seemed to go through the same process Upon gathering the flower-heads, I found, in each case, a single egg laid between the downy calyces. This I saw repeated many times. The insect showed great discrimination in the flower-heads she chose; often she settled on one, walked round it, then flew off to another, and sometimes to a third, before she was satisfied. Never did she seem to be content unless there were some buds on the head; at any rate, I particularly noticed that she avoided those where the blossoms had faded, leaving the calyx, the first food of the caterpillar, dry. Twice I saw what I took to be a female settle on the flower-head of the horse-shoe vetch (*Hippocrepis comosa*); in one case the insect remained some time, but in neither case was there any egg. The eggs were of a glaucous hue, and under the microscope were found to be most perfectly reticulated, the meshes which stood out in relief were not hexagonal, as in *Pyrarga Egeria*, but perfectly rhombical, and knotted at the junction of their angles. They hatched on the sixth day (July 3rd). The caterpillars began by eating the hairy calyx, then they passed into it, and fed on the legume."

The caterpillar is woodlouse-shaped, with a small, shining, retractile head, distinctly divided segments, dilated sides, and a shallow medio-dorsal furrow. The head is black, the body green, the medio-dorsal furrow orange-red, with a paler ridge on each side; on each segment is an oblique yellowish line, bordered below by orange-red, and the lateral dilatation is also yellowish, forming a pale side-stripe; on each segment between this side-stripe and the oblique line already noticed is a linear yellowish spot. The chrysalis is obese and blunt-headed; it is attached by a belt to a stalk of the food-plant; its colour is yellow, with three longitudinal series of black spots, one of which is medio-dorsal.

Obs.—I have seen neither the caterpillar nor chrysalis of this little butterfly, but the concurrent testimony of Hubner, Duponchel, and others, induces me to place confidence in the foregoing description.

TIME OF APPEARANCE.—The butterfly is on the wing in June.

LOCALITIES.—Mr. Birchall reports *Alsus* to be very common in Galway, and also to occur near Belfast and on the Portmarnock sand-hills, and Mr. Fetherstonehaugh takes it at Bray, in the county Wicklow. In Scotland it appears to be very local. Mr. Birchall reports it from Arran, Ardrossan, and Oban. Dr. Boswell Syme finds it by the railway at Seafield, and also between Kirkaldy and Kingshorn; Dr. Buchanan White says it has occurred abundantly near Perth at several places, as at Broxy, but of late years it has been very scarce; it seems confined to the lowland part of the country, although it occurs in all parts of Scotland, both east and west, and as far north as Forres; the dates of capture in Scotland are June 10 in 1858, May 31 in 1859, and June 15 in 1867. In England it seems to be widely, but not generally, distributed; it does not appear in my lists for Berkshire, Cornwall, Cheshire, Hertfordshire, Middlesex, Norfolk, Northampton, Nottingham, Shropshire, Surrey, or Warwickshire, but is present in all the other county lists.



47.—Azure Blue (*Lycæna Argiolus*). Male.



Female.

47. AZURE BLUE.—The colour of the wings in the male is purplish blue with a narrow black hind-marginal border. In the female there is a broad hind-marginal black band on the fore wings, and a narrow black hind-marginal border in the hind wings, and just within this is a series of six transversely oblong black spots. The under side of all the wings is silvery blue-gray; in the fore wings there is a transverse discoidal black streak half-way between the base and tip, and half-way between this streak and the tip are five, and sometimes six, transversely oblong black spots: the hind wings have a transverse discoidal black streak in the centre, and nine, ten, or eleven black spots scattered over the disk: the fringe is white, slightly interrupted in the fore wings, with smoky black spots.

Obs.—There is no series of orange spots parallel with the hind margin of the hind wings, and the white submedian blotch is also absent.

LIFE HISTORY.—I regret to feel my inability to give, with confidence, any particulars of the life history of this species. I believe it is pretty well established that there are two broods in the year, and that the EGGS which produce the first brood of caterpillars are laid on the blossoms of the holly (*Ilex aquifolium*); and the date of the flowering of that tree fixes the date of oviposition. Messrs. Humphreys and Westwood describe the CATERPILLAR as pubescent, and of a greenish yellow colour, with a bright green line down the back, the head and legs being black: the CHRYSALIS, they add, is smooth, brown and green, with a dark dorsal line. My own opinion (expressed very many years ago) that this species migrates, in its alternate generations, from the holly to the ivy, and, *vice versâ*, from the ivy to the holly, was perhaps little more than one of those crude guesses in which all young entomologists indulge; still there are some facts ascertained respecting this insect which favour the idea. At page 98 of the fourth volume of the "Entomologist," we find that in May of the present year Mr. Hedworth observed the insect both flying about and settling on the hollies at Gibside, near Newcastle. At page 112 of the same volume, Mr. Perkins observed it abundantly on laurustinus; on the same page Mr. Clifford says, "the flowers of the

holly, ivy, and buckthorn are the aliment of the caterpillars. These three plants flower but once a year; and while the holly and buckthorn bloom in May, the ivy flowers late in autumn. Yet two broods occur in places where only one of the food-plants named is found; and it would appear, from the condition of the spring brood, as if they had not hybernated, and that there must have been, therefore, two broods of caterpillars. I have seen a female in August depositing eggs amongst ivy, so probably it hybernates in the chrysalis state." Mr. Horley, of Hoddesdon, informs me that in November of last year he beat a caterpillar of *Argiolus* from the blossoms of the ivy, on which it appeared to have been feeding: it changed to a chrysalis the same month, and to a butterfly during April of the present year: this information, coupled with the preceding from Mr. Clifford, seems to point to ivy bloom as the food of the second generation of caterpillars of *Argiolus*, and also shows that in this instance at least the insect passed the winter in the chrysalis state.

Time of Appearance.—The flowering of the holly (*Ilex aquifolium*) fixes with sufficient accuracy the time when the first brood of caterpillars is feeding, and the flowering of the ivy (*Hedera Helix*) may be taken as a guide to the second brood of caterpillars. With regard to the butterfly being on the wing, the following note, which appeared at page 258 of the first volume of the "Zoologist," shows that there is a pretty constant succession of individuals from May to August, both months inclusive. It was contributed by Mr. W. Gaze. "On referring to my register I find that the first specimen of this butterfly I ever possessed was captured at Kedington on the 9th of May, 1833, and was the only one obtained that year: in 1834 one was taken on the 31st of July, and others on the 1st, 8th, and 12th of August: in 1835 the dates of capture were May 8th, 16th, and 19th; June 6th; July 23rd, 27th, and 30th; August 1st and 6th; on the 19th May and 6th of August it was very abundant: in 1836 I took a male at Lavenham on the 7th May, which is the earliest date I ever saw it, and it continued very abundant in the same locality during the whole of that month." At page 334 of the same volume Mr. R. C. R. Jordan extends the period of its appearance by announcing a capture on the 8th of April.

Obs.—At page 213 of the fifth volume of the "Entomologist," Mr. Watkins, of Painswick, gives the following curious instance of depraved taste in this butterfly:—"During July of the present year a drain, which was opened on our premises, attracted several fresh specimens of *L. Argiolus*. It was very interesting to watch them flying over the drain, sometimes alighting to sip the sewage, which they seemed to prefer to the flowers in the adjoining fields." My readers will recollect a similar instance of depraved taste in the Purple Emperor.

Localities.—Generally distributed throughout Ireland, where the holly, on which the caterpillar feeds, is a very common tree. I have no record of its occurrence in Scotland or the Isle of Man. In the south of England it is a common insect, but seems very rapidly to decrease in abundance as we travel northwards.

Warwickshire. Immense quantities were taken in Sutton Park on the 11th of May, 1856—*F. Meyer* in "*Intelligencer*," vol. i., p. 59.



48.—Large Blue (*Lycæna Arion*). Upper side of Male.



Under side of Female.



Under side of Variety in Mr. Bond's Collection.

48. Large Blue.—The hind wings have the hind margin very slightly scalloped. The colour of all the wings is a dull heavy blue, without any of that brilliancy that adorns *Icarus* and *Adonis;* the hind margin of all the wings is black: in the fore wings, and equally distant from the base and tip, is a transversely oblong black discoidal spot, and between this and the hind margin, though still near the middle of the wing, is a transverse series of seven longitudinally oblong black spots: the hind wings have a mere indication of three or four black spots near the middle, and a series of five or six black spots near the hind margin; these have a pale circumscription; the scalloped margin of the hind wings is black, and the fringe of all the wings white. The under side is pearly gray, the base of the hind wings being silvery blue, with a metallic lustre; round the hind margin of all the wings is a double row of obscure black spots; in addition to these, and nearer the middle of the fore wings, are eight intensely black spots, and thirteen similar spots on the hind wings: all these have a white circumscription.

Obs.—This butterfly is distinguished from all other blues inhabiting this country by its larger size, by its scalloped hind wings, by the cluster of black spots in the middle of the fore wings on the upper side, and by the double series of black spots on the hind margin of all the wings, on the under side: these are always unaccompanied by any tinge of orange: the submedian white blotch is also absent.

Life History.—Zeller tells us that the egg is laid on the wild thyme, and that the caterpillar feeds on that plant—a statement copied by myself in the previous editions of this history, and still, as yet, only partially confirmed.

I am indebted to Mr. Merrin for eggs of this species: they were accompanied with the following communication:—"Having at length succeeded in obtaining eggs of *Lycæna Arion*, I am pleased to be able to send you six of them—four on as many sprigs of thyme, and two on another piece. I followed a female specimen last Saturday to a fine patch of thyme, where I watched her for a quarter of an hour, and distinctly saw her lay several eggs. Some of these I afterwards took away, and others I left, marking the plant for future observations. I gathered a large number of likely-looking pieces of thyme on the ground, and on examining them afterwards at home with a glass, found about twenty eggs. They seemed to be generally laid singly on the largest heads of flowers, and those which are most pubescent seem to be preferred. Sometimes, however, I found two eggs on a head, and in one case no less than six." Being from home when the box containing these treasures was so kindly despatched from Gloucester by Mr. Merrin, a delay of some days occurred before it reached my hands, and five out of the six eggs had hatched; the sixth was still perfect, and was forthwith submitted to examination: I found this egg to be a spheroid, much depressed at the north pole, and concave at the south pole, where it was very slightly attached to the hairs of the calyx of a flower of the thyme, on which it had been deposited by the female parent. The surface of the egg is reticulated, the network projecting, and thus communicating a cellular or honeycombed appearance to the egg; the cells are shallow, much more so than those of a honeycomb, and the surface rather more resembling that of a cow's stomach; the septa dividing the cells are extremely thin, and at every junction of septa is an elevated process almost spine-like; the array of these is very conspicuous when the egg is viewed in profile: the cells are of nearly equal size, except at the north pole and in its immediate vicinity, where they suddenly decrease in size, and are, in fact, exceedingly small. The

colour and texture of the egg much resemble white porcelain, with the slightest possible tint of green, excepting the circular space at the pole occupied by the smaller cells, where the green tint is very decided and the limits of this darker colour are clearly defined. On the 4th of July a CATERPILLAR escaped from the egg-shell, and a considerable portion of shell was also absent, as though eaten by the late occupant; the remaining portion of the egg-shell was perfectly colourless, and exhibited a still greater resemblance to fine porcelain. The extruded caterpillar was colourless, but the intestinal canal, filled with an orange-coloured substance like the yolk of a duck's egg, was plainly perceptible. Each segment of the body emits a few scattered hairs: these seem particularly observable near the anal extremity. Mr. Porritt, of Huddersfield, advanced one step farther. He informs us, at page 166 of the same journal, that on the 4th of May two young caterpillars emerged from eggs in his possession; one of these, which had a black head and a pinkish body, he placed on a fresh flower-head of thyme, to which it soon attached itself so closely, and was so similar in appearance, that it was with difficulty he could distinguish it. It fed well until the 14th, when he found it stretched out at full length along the mid-rib on the upper side of a thyme leaf; and, being in the same position the next day, he concluded that it was about to undergo its final moult. A day afterwards this change was effected, and Mr. Porritt then made the following description: Length, about one-sixth of an inch; stout, but tapering towards the head, which is much smaller than the second segment; the general colour was dirty pink, the head brown and shiny; behind the head is a large, almost plate-like, dull black mark, from which extends the rather broad, conspicuous, rust-coloured dorsal line; the body is sparingly clothed with light brown hairs.

TIME OF APPEARANCE.—In 1835, June 8 and 15; in 1798, June 28; in 1836, June 29; in 1833, July 3; in 1799, July 5 and 9; and in 1819, July 14.—*J. C. Dale.*

LOCALITIES.—It has not been reported from Ireland, Scotland, or the Isle of Man. In England it is decidedly local, its ascertained range being restricted to the ten counties mentioned below. Its "metropolis," if I may borrow an expression from the revered fathers of British entomology, is in South Devon; it has occurred in some abundance in Somersetshire, and on the Cotswold Hills in Gloucestershire; from Gloucestershire we ascend to a Midland county, Northamptonshire, in which county a considerable number have been taken: the remaining seven counties have produced but few specimens. All our recent information respecting this species is contained in the "Entomologist," from which journal I have made the following extracts:—

Bedfordshire. Taken in Bedfordshire and sent to me by my friend, Dr. Abbott—*A. H. Haworth*, in "*Lepidoptera Britannica*," page 45.

Buckinghamshire. Clifden—*Lewin.*

Devonshire. It occurs only on the mica slate formation from Bolt Head to Bolt Tail during the latter part of June and beginning of July—*J. J. Reading.* I was very successful this year [1865] in capturing on the 17th of June thirty-six specimens of *Lycæna Arion* near Plymouth, some of them much wasted; the weather was very boisterous, but I fortunately got into a sheltered nook under some high cliffs where apparently there had been a land-slip some years before: the ground was very rough, and it was with great difficulty that I could travel over it, or I should have taken more—*G. C. Bignell*, "*Entomologist*," vol. ii., p. 295. From the Bolt Head to the Bolt Tail. One year I took it wasted on the 14th of June, but the following year it did not make its appearance until the 7th of July. Another year I found it very sparingly on the 14th of July, and then only just coming out. It is an insect, in my opinion, which, if not taken within two days of its emerging from the chrysalis, is worth nothing for a cabinet specimen, for the white fringe will then be gone, as well as most of the blue scales on the upper side of the wings. Anyone desiring to take this insect

in our neighbourhood must regulate his visit according to the weather during the past spring; he cannot do better than stop at the "King's Arms," Salcombe, for the night. Bolt Head is an out-of-the-way place to get at. The nearest point by rail is Kingsbridge Road; you can take the coach from thence to Kingsbridge, a distance of about ten miles. From thence to Salcombe is about four miles by steamer or boat, and then you have about two miles' walk to Bolt Head; the slopes here are very steep, and in dry seasons it is absolutely necessary you should have spikes or long hobnails in your boots, to make sure of your footing, for it puts one in mind of walking on ice, it is so excessively slippery—*G. C. Bignell.* [This is written five years subsequently to the preceding note.]—When I last had the pleasure of seeing you I think you told me that you were not aware that the Bolt Head on the coast of Devon was a locality for *Lycæna Arion:* two years since, when with some friends, we caught several dozen of that species, and about a fortnight since many were again taken in that locality by a friend of mine—*John Gatcombe,* "*Entomologist,*" vol. iv., p. 301. It is very abundant on a rough piece of ground near a village about ten miles from Kingsbridge, in South Devon; I have the name of the village and unquestionable evidence of the correctness of this statement, but have received exact particulars of the locality from Mr. J. F. Hanbury on the condition of not publishing it—*E. Newman.*

Dorsetshire. One specimen was taken by D. Morris at Charmouth, but I have heard of none since—*J. C. Dale.*

Gloucestershire. Rodborough Common, Sapperton, Miserdine Park, Daneway Common—*M. G. Musgrave. Lycæna Arion* has turned up again here [near Gloucester]. I captured three pairs on the 20th, 21st, and 22nd of June, 1867, in beautiful condition, and a few days later a fourth pair, rather worn. On the 29th I was out with a friend, when we took seven specimens, but in very bad condition, and we let some fly again in consequence—*Herbert Marsden,* "*Entomologist,*" vol. iii., p. 314. Several years ago I found *Arion* sparsely distributed on the Cotswold Hills, and it was found by others on other portions of the same range, but from some of the localities in which it was once found it has since disappeared. Last year [1865] several specimens were taken by my friend, Mr. Marsden, of Gloucester, in the same neighbourhood in which I had taken it; and this year I was fortunate enough to capture eleven specimens, and Mr. Marsden has taken still more. Owing to the forwardness of the season generally for insects, it became a nice point for calculation when to look for this species with the prospect of finding it. It is generally from the 14th to the 20th of June, but this year I took the first eleven specimens on the 6th of June. Most of them were in good order, although one or two had evidently been out some days. There was a strong wind blowing, as there generally is on the exposed places occupied by *Arion,* and doubtless this tends quickly to damage its delicate plumage; the spot most frequented by them was, however, partly sheltered by a stone wall. The same locality subsquently yielded as many as were taken on the first day, while all the district round about, though much of it is of the same character, was perfectly clear of them. This tends to show that the species is very local. On another spot, some miles distant, but of a similar broken character, the species was also found, the area, however, being still more contracted. The ground in both cases consists of deserted quarries, from which broken stone has been taken, the sides of the quarries being left sloping, and thick grass, with the usual herbage of hills, growing near. This herbage includes wild thyme, sun-cistus, wild geranium, wild forget-me-not, milkwort, yellow trefoil, and several species of coarse grass—*Joseph Merrin,* "*Entomologist,*" vol. iv., p. 105. On June 1st [1868] I took one specimen of *Arion* on the north-east side of Painswick Hill; business prevented my visiting the place again in the daytime, but having spent four evenings searching in the same place, I succeeded in taking twelve specimens. The last I took on the 23rd of June; it was much worn in appearance. I found them at rest on the

long stems of a species of coarse grass in exposed situations. The ground is rough and broken, consisting of small quarries not in use. There is a wood a short distance off. The extent of ground over which they were found is about half an acre—*C. J. Watkins*, "*Entomologist*," vol. iv., p. 120.

Hampshire. Formerly taken on hills near Winchester, by Mr. Griesbach, when a boy at school there; some of the specimens were in Mr. Curtis's collection—*J. C. Dale.*

Herefordshire. Taken near the aqueduct at Hereford, but rare—*F. E. Harman.*

Huntingdonshire. Monk's Wood, in July —*J. F. Stephens.*

Northamptonshire. The great prize of all the butterflies of the neighbourhood of Polebrook, I hold to be *Lycæna Arion*, which, if I mistake not, was discovered here by myself thirteen or fourteen years since. It is confined entirely, as far as my experience goes, to Barnwell Wold and the adjoining rough fields, with the exception of a single specimen which I once met with in a rough field near Polebrook. Its flight is somewhat peculiar, being different from that of others of the same genus, and more resembling that of *Cœnonympha Pamphilus* and *Epinephele Tithonus.* Independently of its manner of flight and size, it is in most instances easily distinguished on the wing from the other blues by its dark and irony appearance. Many entomologists have, of late years, visited Barnwell Wold in search of *Arion;* in short, a summer never passes without meeting in my rambles brother entomologists from different parts of the country; I rejoice, however, to be able to state that its annual occurrence does not appear to be diminished in consequence. Unless my memory fails me, I think Mr. Wolley, of Trinity College, Cambridge, informed me that one year he captured, in a few days, between fifty and sixty specimens in and about Barnwell Wold, though, in point of weather, the days were anything but favourable—*William Bree*, "*Zoologist*" for 1852, page 3350. I have again this season taken this beautiful insect in plenty at Barnwell Wold, forty-nine specimens; it is a very local insect, for although I have searched the Wold well, I have only found it in one spot, in the corner of a rough pasture under a wood; it is an easy insect to take, flying very low, and is very conspicuous, settling occasionally on wild thyme (*Thymus serpyllum*), the purple bugle (*Ajuga reptans*), and a dwarf thistle; but I have never seen it on bramble blossoms, although they are very abundant—*Frederick Bond;* I captured a single specimen of *Arion* near the village of Wigsthorpe, Northamptonshire, between the 3rd and 20th of June, 1841: it is rather a singular variety, and not larger than *Lycæna Ægon*—*Henry Doubleday*, "*Entomologist*," vol. i., p. 156.

Somersetshire. I took about forty specimens on the 15th June, 1833, in a situation abounding with long grass and brambles, at Langport, near Taunton; and on the same day in 1834 I took about twenty specimens, and Mr. Dale ten—*John Quekett;* subsequently Mr. Quekett visited the same locality on several occasions, and always with the same success—*E. Newman;* hills near Bath—*Lewin.*

Wiltshire. Marlborough Downs—*Lewin;* Savernake Forest—*T. A. Preston.*

Natural Order IV.—Worm-shaped or Cylindrical Caterpillars (in science, *Vermiformes* or *Cylindracei*).

The distinguishing character is that the caterpillars are worm-shaped or cylindrical; in this country they are commonly spoken of as *grubs*, and in France as *vers;* generally speaking, they are excessively destructive to cultivated vegetables, and are a constant source of loss and annoyance to the farmer and gardener: they are without spines or conspicuous bristles, and the skin has often a velvety or downy appearance, which is attributable in a great measure to the presence of very numerous minute warts, each of which emits a hair. The British species constitute three very natural families.

Family 9.—Redhorns (in science, *Rhodoceridæ*).

The caterpillars are smooth, cylindrical, and velvety: they generally feed on leguminous plants, more particularly trefoils and

clover; but one species, which is by far the most abundant, feeds on the common buckthorn (*Rhamnus catharticus*), a plant of a very different Natural Order: they turn to chrysalids in spring or summer, and to butterflies early in the autumn, and pass the winter in that state. The chrysalis is belted and attached also by the tail; its head is pointed and undivided, and seems to be held as far as possible away from the food-plant to which it is attached. The butterfly has six legs, perfectly formed for walking, and in all the species with which I am acquainted the antennæ are short, and tinged with red: there is also a marked prevalence of yellow or orange colour in the wings; in the Arctic species, of which we know very little, a tinge of dull blue is often observable. The continental species, *Colias Nastes*, *Colias Phicomone*, and others partake decidedly of this character; and some species of the same genus, brought home by our Arctic voyagers, still more nearly resemble the larger Blues, such as *Lycæna Arion*.



49.—Pale Clouded Yellow (*Colias Hyale*).

49. Pale Clouded Yellow.—The antennæ are short, straight, and decidedly clubbed; they are of a reddish-brown colour, the club being rather darker, and the extreme tip paler; the fore wings are slightly arched near the base of the costal margin, very straight in the middle, and blunt at the tip: the colour is sulphur-yellow, the fore wings having a black band, which occupies the whole of the apical area: this band is very broad at the costa, and decreases gradually to the anal angle; it is interrupted by a median series of conspicuous, but not clearly defined, sulphur-coloured spots; a little above the middle of the wing is an intensely black oval spot: the hind wings have a slender and ill-defined black margin, and a large median saffron-coloured spot, which is almost double.

Varieties.—There are two distinct shades of colour among the individuals of this butterfly; the more common colour is canary-yellow or sulphur, the other white, with the faintest possible tinge of yellow. Lewin, in his "Insects of Great Britain," page 70, treats of them as species, calling the yellow ones the "Clouded Yellow," and the white ones the "Pale Clouded Yellow:" he gives excellent figures of the upper and under side of each: Haworth rejects the white ones as a species, but retains them as a variety (var. β): Dr. Leach, a most careful observer, and one whose opinion all entomologists receive with profound respect, says "there is a pale variety of each sex;" and the same remark is repeated in Samouelle's "Useful Compendium." Notwithstanding this accumulation of evidence, I incline to dissent from the opinion expressed; the white or whitish individuals appear to me to be exclusively female, while the yellow ones are both male and female, but most commonly male. At page 355 of the first volume of the "Entomologist," Mr. Dale makes an observation exactly in accordance with my own view; he says, "*Colias Hyale* has occasionally a white female." Notwithstanding such a repeated expression of opinion in favour of considering the difference of colour as specific or varietal, entomologists in this country have gradually arrived at the conclusion that the difference in colour was only sexual—a conclusion that, I think, cannot be maintained.

Life History.—In the spring of the year the eggs are laid on various species of clover and trefoil by females that have hybernated in the perfect state; they hatch in a very few days, probably from five to fifteen: the young caterpillar is of a pale green colour, the head being remarkably small in comparison with the body: when in a state of repose it lies along the middle of the leaf on the upper side, so that at night, when the clover shuts up its leaves in sleep, the little caterpillar is quite enclosed, and protected alike from wet and

cold, a beautiful exemplification of the beneficence of an all-wise Creator in providing for the safety, preservation, and welfare of all his creatures, however apparently insignificant: the edges of the leaf meet with such nicety and exactness over the delicate little creature that they seem adherent to each other as though glued together. This interesting observation was made by Mr. W. H. Tugwell, and published in the "Entomologists' Weekly Intelligencer" for 1857. Hubner and others have figured the full-grown caterpillar: it is represented as having a moderate-sized head and cylindrical body, the segments of which are clearly marked and rather tumid; the colour of both the head and body is dull olive-green sprinkled with black dots; in the region of the spiracles it has a narrow white side-stripe interrupted with yellow; it feeds on several leguminous plants besides those which are cultivated, and when full-fed attaches itself to one of the stems, and turns to a green chrysalis with an ochreous border to the wing-cases, and an ochreous stripe down the side extending to both ends: it is attached by a belt as well as by the caudal hooks.

Time of Appearance.—The butterfly has sometimes been seen on the wing in the spring months, also occasionally during the last few days in July, and often throughout August, at the end of which month it retires for the winter. Concerning the caterpillar little can be said, few entomologists having seen it in this country, and no one has made observations as to the date of its appearance.

Localities.—This butterfly is particularly fond of clover and lucerne when in blossom; it has also a decided partiality for chalky districts, especially near the sea; hence the maritime counties of Kent and Sussex have been the most productive of specimens. It has never been observed in Ireland, Scotland, or the Isle of Man. The recorded localities in England are as follows:—

Cambridgeshire. Not uncommon in the county—*Thomas Brown.*

Cumberlamd. Newbeggin Wood; my father missed one in the large field going into the Wood—*J. B. Hodgkinson.*

Derbyshire. One specimen taken at the Via Gallia, near Cromford, by the late John Wolley. I have seen the specimen—*H. H. Crewe.*

Devonshire. Whitsand Cliffs, Totnes, Plymouth racecourse—*George C. Bignell;* Torquay, Sidmouth, Babington—*J. J. Reading.*

Dorsetshire. Seen by Mrs. Dale—*J. C. Dale.*

Essex. Colchester, but rare—*W. H. Harwood;* Epping—*W. J. Argent;* common at Herne Bay in 1868—*H. D. Greville;* Saffron Walden—*W. R. Jeffrey.*

Gloucestershire. Has occurred near Gloucester—*Joseph Merrin.*

Hampshire. Railway banks and roadside banks near Farlington—*W. Buckler;* near Brockenhurst occasionally—*F. Bond;* Bramshott and Liphook—*C. G. Barrett;* Portsdown—*Henry Moncreaff.*

Herefordshire. One taken by Mr. Walter Hutchinson at Kimbolton, near Leominster, in 1868—*Mrs. Hutchinson.*

Kent. Plentiful in clover fields about Dover Castle, and lucerne fields at Folkestone; in 1868, one at Tonbridge—*G. H. Raynor;* Selling, Chilham, Shotterden, Horslip, Stockbury—*H. A. Stowell;* Tenterden—*John Scratton, Jun.;* Darent and Birch woods—*W. Machin;* New Cross—*E. Newman.* Several at Forest Hill in 1857, occasionally at Margate in following years; at the end of July and beginning of August, 1868, this was the commonest butterfly to be seen at Marsh Bay, Margate, where the specimens were flying by hundreds. It was a lovely sight to see these handsome creatures settled on the flowers, and swaying to and fro in the wind; the rich gold colour of their under side contrasting beautifully with the purple flowers of the lucerne; *Hyale* was abundant all over the Isle of Thanet; wherever a little patch of lucerne was to be seen, *Hyale* was sure to be there, even close to the houses: its head-quarters, however, were decidedly at Marsh Bay, which lies between Birchington and Margate, about a mile and a half to the west of Margate; we captured about eight hundred specimens: it would have been easy to have

taken thousands—*H. Ramsay Cox*, "*Entomologist*," vol. iv., p. 179; it appears periodically in all the open country between Canterbury and the sea—*W. Oxenden Hammond.*

Norfolk. Norwich—*C. G. Barrett;* Aldeby in 1868—*N. Fenwick Hele.*

Suffolk. Beccles, Ringsfield—*W. M. Crowfoot.*

Surrey. In 1835 it was common at New Cross by the "Five Bells," and on the spot where some of the buildings of the railway station now stand; more than a hundred specimens were taken in that immediate neighbourhood by myself and others—*E. Newman;* Haslemere in 1868—*C. G. Barrett.*

Sussex. Prinstead, railway bank—*William Buckler;* near Chichester—*W. H. Draper;* one at Bognor—*Roland Trimen.*

Warwickshire. A single specimen was taken near Edgbaston Reservoir in 1868—*Frederick Enock.*

Wight, Isle of. Ventnor and Newport—*Alfred Owen;* rare—*J. Pristo.*

Obs.—The fitful and most capricious appearance of this lovely butterfly in England has led to many predictions and hypotheses respecting the periodicity of its visits; but all attempts to systematize these visits have proved futile. At page 236 of his "Entomologists' Useful Compendium," Mr. Samouelle says, "It occurs in England once in three years, some seasons only locally, at others in the greatest profusion in every part of the country. Mr. Desvignes subsequently suggests, at page 388 of the first volume of the "Entomologist," that it has a periodicity of seven years. It certainly appeared in profusion on the south-eastern corner of our island in 1821 and 1828, but in neither year do precise records appear to have been kept; and I obtained this information subsequently to its multitudinous appearance in 1835, and in consequence of Mr. T. Desvignes' prediction that it would abound in a similar manner in 1842. This excellent naturalist wrote to the following effect: "You very well know that, ever since I took *Hyale* near Brighton in 1835, I have foretold that it would appear in 1842. I made this conclusion from seeing a few specimens with a Brighton collector when I was down there, and asking him how he came to know they would be out that year; he told me he took them seven years previously (namely, in 1828), and from this I concluded they would be found again in seven years from that time (namely, in 1842)." This prediction, and the facts on which it was based, induced me to look backwards "through the dim vista of departed years," and I found some support to this septennial hypothesis in the facts ascertained. When, therefore, the insect visited us in such abundance in 1842, it really seemed as though we had acquired the knowledge of a law of Nature previously hidden from us. Alas! however, for our speculation, the theory broke down utterly in 1849, for only about twenty specimens were that year recorded in the "Zoologist," a journal which had then taken the place of the "Entomologist," which was discontinued for a time. In 1856 there are a few records, both in the "Zoologist" and the "Entomologists' Weekly Intelligencer," which had then commenced its useful career. In 1863 scarcely any notes of the appearance of *Hyale* were preserved, and in 1870 it has scarcely condescended to make itself known as a British insect; but, unfortunately for human calculations, it absolutely swarmed, as we have seen, in 1868, when its advent was not predicted.



50.—Clouded Yellow (*Colias Edusa*). Male.

50. Clouded Yellow.—The antennæ are short, straight, and decidedly club-shaped; their colour is red, the club being rather darker, and the tip paler. The fore wings are rather arched near the base, very straight in the middle of the costal margin, and blunt at the tip. Their colour is brilliant saffron-yellow, with a broad black hind-marginal

band, which not only extends to the apical angle, but is continued in a very narrow form along the inner margin as far as the middle; in this band is a series of five or six yellow



Variety of the Male in Mr. Bond's collection.



Female.



Variety *Helice*.

spots; these are very conspicuous, but not very distinctly outlined; near the middle of the wing, but rather above the middle, is an oblong black spot: the hind wings have a black hind-marginal band extending to the middle of the costal margin, and interrupted by a series of four or five yellow spots. In the male these bands have a very well-defined interim border, and the wing-rays towards the tip are yellow, but the yellow spots in the black band are wanting: the hind wings in both sexes have a large and intensely orange spot in the centre, but this is rendered less conspicuous by the surrounding area being so nearly of the same rich colour.

Varieties.—Mr. Bond possesses an extraordinary variety of the male, which he has kindly lent me to figure in this work, and in which the saffron-coloured part of the wings is clouded and blotched with smoky brown. There is also a beautiful variety of the female of this insect in which the usual rich saffron-yellow colour is entirely absent, and is replaced by pale ochreous, approaching to white: the hind wings are darker than in ordinary specimens, and the central orange spot, owing to the contrast of colour, is more conspicuous. This is the *Papilio Helice*, or White Clouded Yellow of Haworth. (*Lepidoptera Britannica*, p. 12, No. 11.)

Obs.—Although this variety in its extremest form is so different from the type, there occasionally occur intermediate specimens.

Life History.—The eggs are laid in May and June by females that have hybernated, on the leaves of Dutch clover (*Trifolium repens*), common clover (*Trifolium pratense*), and very probably on other species of the same genus of plants: they are placed in an erect position on the upper side of the leaf, and are shaped much like a ninepin, somewhat tapering towards both ends, and decidedly pointed at the tip; their colour, when extruded, is pale yellow, but they gradually assume a darker hue, and finally become tinged with pink; some of these eggs I obtained through the kindness of Mr. Alfred Owen, and it is very noteworthy that three of them were attached to the long hair-like scales which clothe the body of the parent; the young caterpillars emerged on Midsummer-day, but they died almost immediately, and I made no description of them in their babyhood. Shortly after this untoward occurrence, Mr. Buckler most kindly sent me a caterpillar about three-quarters grown, and I made the following description. It rests in a nearly straight position, but with the anterior segments slightly raised, and the head slightly

bent under, Sphinx-like; when annoyed, it falls from the food-plant and forms a complete ring: the head and body are of nearly uniform width, the body cylindrical, the thoracic segments somewhat incrassated, the terminal segments somewhat attenuated; the crown is gibbous and without a notch; the head is covered with minute warts, and each wart emits a short hair; the segmental divisions are indistinct and transversely wrinkled, the wrinkles dividing each segment into narrow sections, each section composed of a series of minute warts, and every wart emitting a short hair: in form and habit this caterpillar much resembles that of the Small White Cabbage Butterfly. The colour of the head and body is grass-green, the minute warts being black, and each being surrounded by a whitish ring: there is a very distinct but rather narrow whitish stripe along each side; it commences on the second and terminates on the twelfth segment, including the spiracles, which are yellowish.—*Newman.*

The individual described never became a chrysalis; but Mr. Buckler was fortunate in obtaining a number of chrysalids from the same brood of eggs, and of these he published the following description in the forty-first number of the "Entomologists' Monthly Magazine":—"The CHRYSALIS was attached by the tail, and with a belt of silk thread round it close below the thorax: the head was generally upwards, though in some cases a horizontal position, or nearly so, was chosen: the chrysalis is moderately stout; the thorax round, and projecting on the back; the head terminating in a sharp point; the wing-cases are long and well developed, projecting below the body. The colour of the back and body is a very pale yellow-green, and a pale yellowish stripe on each side below the wing-cases, on the body; on the under side beneath them were three minute black dots, followed by a stripe of dull dark red; the wing-cases were a rather deeper and yellower green, which, a few hours before the perfect insect emerged, became suffused with red. In the centre of each wing was a minute black dot, and a row of five similar dots near their lower borders. The point on the top of the head was dark olive green above, sharply contrasted on the under side with pale primrose yellow, and both gradually blending into the colours below."—*Buckler.*

Mr. Buckler has also noticed a character of the caterpillar which altogether escaped me. He says the whitish side-stripe "was embellished on each segment by a pink or red blotch in the middle of it, and a black spot immediately under it; while a little in advance of the red was seen the oval whitish shining spiracle."

TIME OF APPEARANCE.—August, September, October, and November: it hybernates, but very frequently perishes before the spring; the survivors reappear in May and June.

Obs.—At p. 77 of No. 51 of the "Entomologists' Monthly Magazine," there is an interesting note by Mr. C. W. Dale, in which he says:—"I found a caterpillar of *Edusa* last October at Charmouth; it changed to a chrysalis on our journey home, and died in the act of emerging at the end of March." This is the only well-authenticated instance I have met with of this species passing the winter in the chrysalis state: it must be a very rare occurrence.

LOCALITIES.—Clover and lucerne fields when in blossom. We learn from Mr. Birchall that in Ireland it is common in some seasons on the south and east coast: it occurs more rarely north of Dublin: appeared in profusion at Killarney in 1835. The Hon. Emily Lawless informs me it is occasionally abundant at Lyons, in the county Kildare, both in the garden and hill wood: it is also occasionally taken in one or two localities near Dalkey, county Dublin. Mr. Fetherstonhaugh has taken it at Glenmore, Crossmolina, and has found it, but not abundantly, in the county Wicklow; and Mrs. Battersby records the capture of one specimen near the village of Stone. It has been taken by Mr. Warrington near Douglas, in the Isle of Man. Mr. Birchall informs me of a single specimen—a female—which he took at Largs on the 12th of September, 1852, but it is entirely omitted by Dr. Buchanan White in his "Butterflies of

Perthshire," although he reports it as having occurred both in Dumfriesshire and Ayrshire. In England it is very generally distributed, but its appearance is capricious. We have seen how its congener *Hyale* has occasionally swarmed in the extreme south-east of the island. *Edusa* is occasionally equally abundant in the extreme south-west; in the intervening southern counties neither of the species can be described as common; and farther north both are comparatively scarce. In every list from Bedfordshire, Berkshire, Buckinghamshire, Cheshire, Derbyshire, Dorsetshire, Glamorganshire, Hampshire, Hertfordshire, Huntingdonshire, Kent, Middlesex, Monmouthshire, Norfolk, Northamptonshire, Nottinghamshire, Shropshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Warwickshire, Wiltshire, and Worcestershire, it is reported as occurring, but without any particular notes of its abundance, rarity, or periodicity.

Cambridgeshire. In many parts of the county it is sometimes very common—*F. Bond;* not uncommon in the county—*Thomas Brown.*

Cornwall. Common at New Quay—*H. D. Greville;* sometimes very abundant at Looe: at page 338 of the second volume of the "Entomologist," Mr. Clogg informs us that in the autumn of 1865 it was abundant: during the months of August, September, and up to the 14th of October, a single collector, on counting his captures, found he had taken three hundred and forty-six specimens: he then, at Mr. Clogg's request, kept a daily record, with the following result:—October 14th, seventy-eight; 16th, eighty-two; 18th, twenty-five; 20th, seventy; 25th, thirty-eight; 28th, seventy-five; November 1st, seventy-seven; total, nine hundred and thirty-five. The numerical disparity in the sexes was at first most remarkable, there being taken, up to the 14th of October, but twenty-three females to three hundred and twenty-three males: after that day the females became more plentiful, or at the rate of fourteen males to one female, until, on the last day, they exceeded the males, the numbers being twenty-three females and twenty males: the total number of females captured was one hundred and ninety, reducing the average to four males to one female. There were eight of the pale (or *Helice*) variety taken. With very few exceptions, all these captures were made in two fields of wheat stubble, together about twenty-six acres in extent, situated close to the sea shore, very hilly, and with a south-east aspect." At page 1 of the third volume of the "Entomologist," Mr. Clogg makes some slight corrections to his former report, and brings up the grand total to nine hundred and seventy-two.

Cumberland. This insect is more common in Cumberland than was formerly the case, specimens occurring all up and down, but most commonly on the coast about Workington, Carlisle, and Whitehaven—*J. B. Hodgkinson.*

Devonshire. The typical form is very abundant along the coasts of Devonshire, and common in many localities inland; but it is very inconstant in the period of its appearance: sometimes, indeed, several consecutive years have passed in which the insect has not been observed. The variety *Helice* usually occurs freely: Axminster, Exeter, Teignmouth, Torquay, Buckfastleigh, Whitsand Cliffs, Bovisand, Plymbridge, Berry Head, Bolt Head—*J. J. Reading;* Compton, Millbrook—*G. C. Bignell;* on the railway banks at Tothill, near Plymouth—*E. James, Jun.* Through the kindness of correspondents these and many other localities have reached me from several sources in addition to those mentioned: in no other instance does the writer allude to the inconstancy of appearance mentioned by Mr. Reading, so that the inference to be drawn is that the insect is generally of frequent occurrence in the county.

Durham. Scarce, and appearing at uncertain intervals, in the autumn; Fulwell in 1826, Castle Eden Dene, Darlington, Sunderland, Shull, Wolsingham, Ryhope—*Wailes' "Catalogue."*

Essex. In all parts of the county, and apparently occurring every year, although some years more plentiful than others—*W. H. Harwood.*

Gloucestershire. Wootton-under-Edge; generally to be found every year in the clover fields; once or twice it has occurred in the greatest profusion, probably introduced with the turnip seed—*V. R. Perkins;* generally distributed, and sometimes common—*Joseph Merrin.* Mr. Greene, Mr. Wheeler, Mr. Grigg, Mr. Musgrave, and Mr. Hudd write to the same purport.

Herefordshire. Common in 1858 and 1859—*Mrs. Hutchinson.*

Northumberland. One specimen was taken at Whitley—*J. Hancock.*

Wight, Isle of. It occurs every year in the island in clover fields, but not always in equal abundance: generally common, sometimes abundant—*James Pristo.*



51. Brimstone (*Rhodocera Rhamni*). The lower figure represents the body of the butterfly viewed sideways, showing the curved antennæ.

51. Brimstone.—The antennæ are short, arched, and gradually thickened towards the tip, which points downwards: the costal margin of the fore wings is straight in the middle, but sharply arched at the base and tip; each of the wings has one sharp angle; the fore wings at the tip, the hind wings about the middle of the hind margin. The colour of all the wings is bright canary yellow in the male, pale greenish yellow in the female; near the centre of each wing is a small saffron-coloured spot.

Varieties.—This familiar species is subject to variation of a particular kind: streaks or dashes of vivid orange make their appearance in different parts of the wing, and these frequently do not correspond on the corresponding wings: the colour thus irregularly occurring exactly resembles that which obtains uniformly on the disk of the wings of the Continental species, *Rhodocera Cleopatra.*

Life History.—The eggs are laid singly, about the middle of April, on the twigs of the two buckthorns (*Rhamnus frangula* and *catharticus*), the only shrubs on which the caterpillar is known to feed. In the neat hedgerows so common in this country, composed of a mixed growth of whitethorn, blackthorn, oak, maple, hazel, dogwood, and an occasional plant of buckthorn, it is very interesting to watch the female Brimstone hovering about the hedge, and selecting, with the most unerring instinct, the twigs of buckthorn, though infinitely rarer than either of the other shrubs, and depositing her eggs on these and these only; the eggs are elongated and of a bright yellow colour; they hatch in about fourteen days; thus the 1st of May may be considered the earliest day for disclosure, but the periods both of oviposition and of emergence frequently extend over three weeks, or even a month, so that during the month of June we find caterpillars varying greatly both in size and age; nevertheless, generally speaking, the caterpillar is full-grown at the end of June, and then rests in nearly a straight position on the leaves or twigs of the buckthorn. Its head is small, decidedly narrower than the second, and still narrower as compared with the third, fourth, and following segments; the body is widest at the fourth and fifth segments, and thence gradually tapers to the caudal extremity: it is very convex on the back and transversely wrinkled, slightly dilated at the sides below the spiracles, and rather flattened on the ventral surface; the transverse wrinkles divide the back into sections, of which every sixth is just double the width of either of the others; each segment has one wide and five narrow sections. The colour of the dorsal surface of the head and body is dull apple-green, much resembling the leaf of its food-plant, but densely covered with extremely minute black warts, each of which

emits a small, short, and slender, white bristle; the lateral dilatation is glaucous-green, terminating in a slender waved white stripe; the spiracles are very pale; the ventral surface, legs, and claspers are semi-transparent apple-green; the minute points are present, but are much fewer, and therefore do not communicate the same dull colour to the ventral which is observable on the dorsal surface. About the 18th of June the caterpillar lightly covers the back of a leaf, or one of the twigs of its food-plant with a carpet of extremely delicate white silk, and to this it attaches itself by the anal claspers, forming also a belt or loop, the two extremities of which are firmly fixed, close together, to the silken carpet at the distance of a third of an inch from the anal claspers; this loop passes over the back of the caterpillar, supporting it equally well whether on an erect twig or the horizontal under surface of a leaf: this arrangement being completed, the lateral plates of the head separate, and the skin of the back is partially ruptured, a green pointed protuberance making its appearance through the aperture; this green protuberance performs a slow but constant circular gyration, and at every gyration the skin of the caterpillar recedes towards the anal extremity, leaving more and more of the enclosed CHRYSALIS exposed: when the moult is complete, the shrivelled skin remains at the anal extremity. The chrysalis is pointed at both extremities, but has a dorsal thoracic hump, and a large, bulging, rounded mass in front, which comprises the wing-cases; it has also three ridges —one medio-dorsal, extending from the pointed head to the anal extremity; the others lateral, and bounding the dorsal area; these latter are produced into an obtuse angle at the insertion of the wing-cases, and at these angles the diameter of the chrysalis is greatest, and diminishes thence rapidly to the pointed head, and gradually to the anal extremity; the lateral outline is, however, slightly incurved behind the thorax; the three ridges are very inconspicuous. The colour of the chrysalis is bright apple-green; the head and thoracic angles are tipped with purple-brown, this colour extending from the head towards the thoracic hump, and from the thoracic angle towards the tail; the bulging mass containing the wing-cases is so transparent that the outline of the body may be seen beneath it; the dorsal ridge is darker than the ground colour, forming a narrow, indistinct, smoke-coloured, medio-dorsal stripe; the lateral ridge is paler than the ground-colour, and forms a narrow, rather indistinct, whitish stripe on each side of the chrysalis. The chrysalis state lasts for twenty days; the earliest examples, those from eggs laid on the 15th of April, may be expected to appear on the wing on the 15th of July. The sexes always keep apart during the remainder of the year, never taking the slightest notice of each other; and both sexes enter on a state of semi-hybernation very early, but are frequently tempted abroad by mild as well as sunny weather: in March they reappear, and the usual attention of the sexes takes place, followed by the deposition of eggs as already described: the butterfly life of this species sometimes lasts for an entire year, the faded butterflies of one year actually surviving until those of the ensuing year are on the wing; those, however, which appear in spring, although tolerably perfect, never have the exquisite freshness and beauty which they possessed when disclosed in the autumn; and although individuals of two consecutive years may often be seen together, the eye of the experienced entomologist will not fail to detect the difference.—*Newman.*

TIME OF APPEARANCE.—Caterpillar in May and June; chrysalis in July; butterfly chiefly in July and August, but to be seen every month in the year.

Obs.—All the English students of entomology commence their career by considering the vernal hybernated individuals of the Brimstone to be the descendants of the autumnal ones: this very pardonable mistake was discussed at great length in the "Zoologist" for 1855 and 1856.

LOCALITIES.—Woods, lanes, and gardens. Mr. Birchall says that it occurs at Killarney, but is apparently confined to the south of Ireland; and the Hon. Emily Lawless

informs me it is abundant at Kylemore Lake, in Connemara, and that she captured a pair at Clydach, on the east shore of Lough Corrib. It has not been observed in the Isle of Man or in Scotland. In England it is very generally distributed, but is rather a southern than a northern species. The following notes on the subject are interesting:—

Cumberland, Northumberland, and Westmoreland. The reports from these counties omit the species altogether; but Mr. Stainton gives the letters *L. D.* thus in italic capitals, which, at page 9 of the "*Manual*," he explains as meaning that the insect has occurred in the Lake District of Cumberland and Westmoreland; but it is not found there every year.

Dorsetshire. Glanville's Wooton; it has nearly disappeared: buckthorn is very rare with us—*J. C. Dale.*

Durham. Single specimens have been taken at Darlington, but neither species of buckthorn grows in the northern parts of the county—*W. Maling;* once at Darlington; probably its extreme northern locality, as the food-plants of the caterpillar, *Rhamnus catharticus* and *R. frangula*, although not rare in Yorkshire, barely reach the southern parts of Durham—*George Wailes.*

Cornwall. Everywhere in the county—*Stephen Clogg;* plentiful in woody vales in the neighbourhood of Plymouth, and in similar places throughout Devon and Cornwall—*J. J. Reading;* "South limit of *Rhamnus catharticus*, in (Devon?) Dorset, Wight, Kent"—*H. C. Watson*, "*Cybele Britannica*," vol. i., p. 273; "South limit of *Rhamnus frangula* in Devon, Isle of Wight, Kent"—*H. C. Watson*, at page 274 of the same work; "the south limit of *Rhamnus frangula* may perhaps be extended to Cornwall, on the authority of F. P. Pascoe"—*H. C. Watson*, at page 404 of vol. iv. of the same work. Probably no English county has been better botanised than Cornwall, and yet there is no record of the common buckthorn having occurred there, and only one of the rarer species. I introduce this observation, because it is anomalous for a butterfly to occur plentifully where its food-plant is absent, or excessively rare.

Family 10. SWALLOW-TAILS (in science *Papilionidæ*).

The caterpillar is smooth and cylindrical it has a bifid organ in the neck, which it can protrude at pleasure. The chrysalis is girted and attached by the tail; its head is eared or bifid. The butterfly has rather long, straight, and clubbed antennæ, and tailed hind wings.

Obs.—I have absolutely no knowledge of the extent or contents of the family *Papilionidæ* or the genus *Papilio*, nor can I form any satisfactory notion of what would be considered the essential characters of either. My readers will, therefore, kindly accept my brief characters as applying only to the single species with whose life-history I am familiar. Dr. Horsfield, certainly the most learned author on the Pedunculated Lepidoptera with whose works I am acquainted, combines the twenty-one genera differentiated by Hubner into one genus—*Papilio.* He divides his chilognathiform group, corresponding in a measure with my vermiform Order, into two sections, which he calls A and B. A comprises the English genera—*Rhodocera*, *Colias*, *Pieris*, and *Aporio;* and B combines the doubtfully British *Doritis*, with *Papilio Machaon.*

52. SWALLOW-TAIL.—The costal margin of the fore wings is decidedly arched, the tip pointed, but not sharply so, and the hind margin slightly waved; the hind margin of the hind wings is scalloped and tailed. The ground colour of all the wings is yellow, but a large portion is occupied by black markings, which again are powdered with yellow scales; all the wings have a black blotch at the base and a broad hind-marginal band of the same colour: all the wing-rays are black, and on the costal margin of the fore wings are three squarish black blotches; in the black hind-marginal band of the fore wings is a series of eight yellow oblong spots, and in the hind-marginal band of the hind wings is a series of six blue clouds and two series of yellow crescents, six in each; the outer part of these occupies the extreme fore margin: at the anal angle of the hind wings is a conspicuous round red spot, the upper edge of which is adorned



52. Swallow-tail (*Papilio Machaon*).

with purplish scales, and the red is almost enclosed in a black circumscription.

Obs.—At page 340 of the first volume of the "Entomologist," Mr. Gaze has given us so graphic an account of the early life of this beautiful butterfly that I prefer transferring it entire, as a prelude to my own description of the caterpillar and chrysalis from life.

LIFE HISTORY.—"Having in the spring of 1840 obtained a number of chrysalids from Burwell-sedge Fen, near Newmarket, Cambridgeshire, a male and female emerged from them on the morning of the 27th of May, and were left, near each other on the window-blind to expand and dry their wings; on my return from a short walk I was agreeably surprised to find them *in coitu*, and, having a fine plant of the marsh hog's fennel or milk parsley (*Peucedanum palustre*), growing in a garden-pot, I placed it in the window of the room, and confined the female on it, as well as I could, with the window-blind. On the 20th she had deposited fourteen EGGS, but appearing nearly exhausted I supplied her with a little moistened sugar in a teaspoon, at the same time uncurling her trunk with a pin: she seemed to enjoy her feast, and being left with the sash raised about an inch for the admission of air, made her escape. The plant was returned to its place in the garden with the eggs attached; they were of an oval shape and of a pale green colour, but changed in a few days to steel-blue, and, before the exclusion of the caterpillar, to black. The first CATERPILLAR was hatched on the 10th of June, and the others on the following day; they were at first black and spiny, with a light-coloured patch in the middle of the back. The shell of the egg was, in every instance, the first meal of the caterpillars, and the cast-off skin was always first eaten after every change, which took place on the 18th and 26th of June, and the 3rd and 13th of July, when they had completely stripped the plant. At every change of skin the caterpillars acquired more of their brilliant colours, and when full-fed altogether looked very beautiful, and if touched darted forth their retractile horns, scenting the garden very powerfully to some distance. Not being able to get a fresh supply of the food-plant I placed some carrot-leaves in a small jar of water, and introduced them amongst the stalks of the *Peucedanum*. Contrary to my expectations, the caterpillars fed on the carrot-leaves without any apparent reluctance, and by the end of the month were full-fed. Up to this time, although left in the garden day and night, they never quitted the food, but now it was impossible to keep them on it; and after one had been finally lost, the others were removed into the breeding cage, where they passed into the chrysalis state on the 30th and 31st of July and the 2nd of August. The first butterfly was produced on

the 14th of June, 1841, and ten more in the course of a fortnight. One died in the chrysalis state, and one continued in that state until this day, the 10th of May, 1842, when a very fine and perfect female made her appearance. I tried very much to continue the brood, but was unsuccessful."

The full-fed caterpillar ascends the reed stems, generally so abundant in its natural haunts, and often remains stationary in a perfectly straight position. The head is narrower than the second segment, and very decidedly narrower than the following segments: its position is prone, and it is slightly notched on the crown: the body is stout and cylindrical, but has the divisions of the segments strongly marked; the second segment has a transverse dorsal slit, from which the caterpillar can protrude at pleasure, but more particularly when annoyed—a yellowish divaricating process with the use of which I am quite unacquainted, and will therefore copy a few lines from that inexhaustible storehouse of entomological information, the "Introduction to Entomology," by Messrs. Kirby and Spence. These learned authors introduce the subject in this way:—"I shall next beg your attention to those insects that emit their smell from particular organs. Of these, some are furnished with a kind of scent-vessel, which I shall call *osmateria*, while in others it issues from the intestines at the ordinary passage. In the former instance the organ is usually retractile within the body, being only exserted when it is used: it is generally a bifid vessel, something in the shape of the letter Y. . . . A similar organ, half-an-inch in length and of the same shape, issues from the neck of the caterpillar of the Swallow-tail butterfly. 'When I pressed this caterpillar,' says Bonnet, 'near its anterior part, it darted forth its horn as if it meant to prick me with it, directing it towards my fingers, but it withdrew it as soon as I left off pressing it;' this horn smells strongly of fennel, and probably is employed by the insect, by means of its powerful scent, to drive away the flies and ichneumons that annoy it," vol. ii., p. 242. And again:—"In a former letter I gave you a short account of the remarkable Y-shaped, as it should seem, scent organ of the beautiful caterpillar of the Swallow-tail butterfly: I will now speak of it more fully. It is situated at the anterior margin at the back of the second segment, close to the head, from which, at first view, it seems to proceed. At the bottom it is simple, but divides towards the middle, like the letter Y, into two forks of a fleshy substance, which it can lengthen, as a snail does its horns, to five times their ordinary extent, or retract them within the stalk so as wholly to conceal them. Sometimes it protrudes one fork, keeping the other retracted; and often withdraws the whole apparatus for hours together under the skin, and its place is only marked by two tawny-coloured dots, so that an ordinary spectator would not suspect the existence of such an instrument," vol. iii., p. 149. Dr. Horsfield, in his "Catalogue of Lepidoptera in the Museum of the East India Society," represents the caterpillar of *Papilio Xuthus* with a similar appendage; indeed, it is extremely probable that many of the beautiful insects which now constitute that strange assemblage known as the genus *Papilio* may be found to possess it.

The surface of the skin is velvety, but every parts emits very short stiff bristles, which are only rendered conspicuous by means of a lens, and then will be found to abound on the head and on the twelfth and thirteenth segments. The colour of the head is yellowish green, with a black spot above the mouth, two longitudinal black stripes down each cheek, and an oblong black spot between them, which includes the ocelli; there is a similar oblong black spot immediately above the mouth. The ground colour of the body is a most delicate and lovely green: the second segment has three oblong black spots immediately behind the head and in front of the scent-organ already described; the interstices between the segments are velvety black and unspotted, forming twelve transverse bars, and alternating with these are as many velvety transverse black bars, each being interrupted by six bright orange spots, except on the second segment, which has the black band unspotted

and the thirteenth segment, which has the place of the band supplied by a transverse series of four roundish black spots, and no orange spots: the spiracle, when present, is situated immediately above the outer or lower orange spot; on each side the caterpillar there are three roundish black spots, forming a triangle above each of the ventral claspers: the ventral surface is pale, and more inclined to glaucous green than the dorsal, and is adorned with a medio-ventral series of oblong black markings. In a state of nature the caterpillar feeds not only on hog's fennel (*Peucedanum palustre*), but also on cow parsnep (*Heraclium sphondylium*): in gardens I have found it feeding on rue; and in confinement it thrives on the leaves of carrots, as observed by Mr. Gaze. When full-fed it ascends the reeds in the neighbourhood of its food-plant, and, assuming a vertical or ascending position, fastens itself to the reed-stalk by its anal claspers, and also by a belt round its body, and then turns to a CHRYSALIS of a uniform pale dull yellow-green colour, the anterior extremity having four lobes or protuberances ranged in a transverse series, the exterior ones much larger than the others; the thorax has also three distinctly pronounced prominences, one on each side, the third dorsal and medium.—*Newman.*

TIME OF APPEARANCE.—The caterpillar feeds during a greater part of the summer, and turns to a chrysalis in the autumn, and in this state remains throughout the winter; the butterfly appears in the following spring, and a succession of specimens occur during the summer.

LOCALITIES.—*Machaon* is unrecorded as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems to have been formerly widely and plentifully distributed, for independently of the single captures mentioned below, all of which may be supposed to have been insects purposely liberated, we have the most reliable evidence that it was "common" in several parts of Dorsetshire; that it "used to be taken" in Glamorganshire; that it was taken "plentifully" in Hampshire; that it was "repeatedly found" at Tottenham in Middlesex, and at Battersea-fields in Surrey. Haworth says, "I know it breeds near Beverley in Yorkshire;" and the concurrent evidence of many entomologists proves that it was "formerly taken" in the Isle of Wight. From all these counties it seems to have disappeared, and it can now only be sought for with any prospect of success in the counties of Cambridgeshire, Huntingdon, Norfolk, and perhaps Suffolk.

Cambridgeshire. At p. 527 of the first volume of the "Entomological Magazine" we are told by Mr. Stephens that the caterpillar was found in various stages of growth on the 29th June at Sedge-fen, and on the 4th and 5th July at Whittlesea-mere—by *Mr. W. Christy;* Ely—*Marshall Fisher;* it was formerly plentiful in Horning and Wicken-fens—*F. Bond;* it is still common in Wicken-fen—*Thomas Brown.*

Cumberland. One was taken at Gilsland, about fifteen miles from Carlisle, but whether it had been bred and escaped, or how it came there, I cannot tell—*J. B. Hodgkinson.*

Derbyshire. Two specimens near Matlock—*Thomas Lighton.* The late Mr. John Wolley afterwards explained, at p. 944 of the third volume of the "Zoologist," that he turned out many hundreds of this butterfly in the springs of 1843 and 1844, most of them at Matlock.

Dorsetshire. In plenty, formerly at Glanville's Wootton, but none have been taken since 1816; at Charminster by Mr. John Garland; at Hazlebury Common by the late Mr. H. Seymour; and near Cranborne by the late Rev. A. Storey—*J. C. Dale.*

Essex. Saffron Walden; supposed to have been brought to the neighbourhood in the chrysalis state—*W. R. Jeffrey.*

Kent. At p. 159 of the fourth volume of the "Entomologist," Mr. W. O. Hammond writes thus in October, 1868: "A young lady, a near neighbour of mine, this summer took *Machaon* in a clover field. I believe the chrysalis of *Machaon* was put down in some numbers experimentally a few years back. These marshes are some eight miles off. Is it possible this was one? A single specimen was taken at Norrington thirty years ago by my brother."

Glamorganshire. *Machaon* used to be taken some years ago at Penclawdd and Llooghor—*J. T. D. Llewelyn.*

Gloucestershire. Bristol—*Samouelle's "Useful Compendium."*

Hampshire. A friend informed me that he possessed two specimens taken in the New Forest—*G. B. Corbin;* cowslip meadow near Lymington. It has been taken plentifully near the New Forest—*Samouelle's "Useful Compendium."* I saw to-day a specimen of *Machaon* taken on the 8th July in the New Forest—*Walter J. Wilkinson.*

Huntingdonshire. Yaxley-fen, Holme-fen, &c., years ago—*F. Bond.*

Lancashire. A specimen of this insect was found in this neighbourhood on the turnpike road, and was brought to me alive and in good preservation this day—*R. J. Shields,* 24th July, 1856—"*Entomologists' Weekly Intelligencer,*" vol. i., p. 139.

Norfolk. Horning and other fens—*C. G. Barrett;* once in Aldeby Marshes—*W. M. Crowfoot;* Norfolk Broads—*W. H. Draper.*

Middlesex. I have repeatedly found the caterpillar feeding on rue in a garden in the occupation of some friends of the name of Forster on Tottenham Green: this was probably fifty years ago—*E. Newman.*

Suffolk. The family of a clergyman residing near Ipswich told me they had taken *Machaon* on the banks of the Stour—*H. H. Crewe;* in 1841 three specimens of *Machaon* were taken by three different collectors at Haverhill—*W. Gaze;* on the 25th of August, 1870, Mr. Garrett of this town took a fine specimen of *Machaon* in a clover-field about a mile from Ipswich: it was perfect, with the exception of a small piece out of one wing—*Edward F. Bisshopp,*—"*Entomologist,*" vol. v., p. 17.

Surrey. At p. 140 of the first volume of the "Entomologists' Weekly Intelligencer," we read as follows: "In the osier beds behind Beaufoy's distillery in Battersea Fields, year after year I have been accustomed to find the caterpillars of *Machaon,* and have always raised the perfect insect from them, yet, though constantly on the watch, I never once there detected it in the winged state"—*George Austin.*

Sussex. A specimen of this butterfly occurred this week near Balcombe tunnel; it was taken in his cap by a man working in the tunnel, and of course spoiled—*Eli T. Silvester,* "*Entomologists' Weekly Intelligencer,*" vol. i., p. 197, but without date; Pulborough, Sussex Common—*Stainton's "Manual."*

Wight, Isle of. Taken in the Isle of Wight by the late Captain Bray—*J. C. Dale; Machaon* used to occur at Freshwater, but is probably now extinct—*Alfred Owen;* I never took Machaon myself, but am assured it was taken in this parish years ago—*James Pristo.*

Yorkshire. At p. 27 of the Preface to Haworth's "*Lepidoptera Britannica*" we find the following passage: "I know *Machaon,* the common swallow-tailed *Papilio,* breeds near Beverley yet, and my brother-in-law, R. Scales, of Walworth, near London, possesses a specimen of it which was taken there seven years since."

Family 11.—Whites (in science *Xeridæ*).

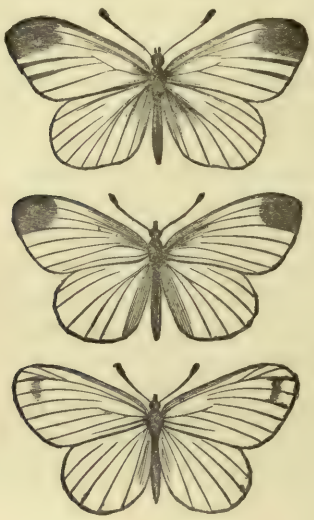
The caterpillar is cylindrical, transversely wrinkled, and beset with very short hairs. The chrysalis is girted and attached by the tail; its head is pointed. The butterfly has distinctly clubbed antennæ, and rounded hind wings which are never tailed.

53.—Wood White.—The body is very long and slender; the wings are rather long and narrow, rounded at the tip, and plain round all the margins: the colour of the upper side is white, with a nearly square spot at the tip: in the female this spot is indistinct or absent. On the under side the basal half of the fore wings and the whole of the hind wings are clouded with faint greenish gray; this colour forms two indistinct and imperfect transverse bands.

Varieties.—There is a pure white variety with a round dusky spot at the tip of the fore wings, which occurs very rarely, and only in the south of England; it is more common in the south of Europe: the ordinary autumnal specimens are paler and smaller than the vernal ones: the wing-rays also,

where they unite with the hind margin, are tinged with smoky black in the type, but not in the variety, which is apparently the *Diniensis* of Continental entomologists.

LIFE HISTORY.—At page 210 of the third volume of the "Entomologists' Monthly Magazine," Mr. Hellins has published the following "Notes on the Transformations of *Leucophasia Sinapis*"; and although I cannot do otherwise than feel regret that I have never had the good fortune to possess materials for a life-history of the species from nature, that regret is more than compensated by the pleasure and advantage of obtaining the details from so trustworthy an authority:—"The EGGS seem to be deposited singly; in shape they are cylindrical, very long, standing erect on one end, the upper end coming to a point, which is curved a little on one side (reminding one somewhat of the shape of a cucumber), ribbed longitudinally, about four ribs appearing in any one view: colour, a glistening yellowish white. The CATERPILLAR, when full grown, is about three-quarters of an inch in length; the head is globular, and rather smaller than the second segment; the body is cylindrical, tolerably uniform in bulk, but tapering very gradually towards the tail, the anal flap terminating squarely, and beneath it there are two very small blunt points; the skin is wrinkled, with six folds to each segment, covered uniformly, but not densely, with very fine short whitish down. The colour is a beautiful green, the anterior segments being minutely dotted with black; the medio-dorsal stripe is dark green, edged with yellowish green: the spiracular stripe is distinct, and of a fine clear yellow, edged above with darker green; the spiracles are undistinguishable, the ventral surface and legs are translucent green. When the caterpillar is about to spin, it fastens itself, with the head upwards, to a stem of its food-plant by a little webbing at the head and the tail, and a thread round the fore part of the body, and at first it rests quite flat on the stem: after some hours, it raises its back and bends itself into a bow, the head and tail still fastened to the stem, and the thread round the body being much stretched; in this position it remains about two days, when it casts its skin for the last time (the threads which fasten down the head apparently being attached only to the caterpillar skin), and becomes a chrysalis. The CHRYSALIS, when arrived at its full colour, is very beautiful. In shape it is slender, very acutely pointed at the head, not so acutely at the tail, the wing-cases projecting in a swelling-curve to nearly twice the width of the body, and meeting in a blunt ridge; the head is thrown back, and the chrysalis rests with the wing-cases touching the stem, fastened by the tail and the thread round the body. The skin is semi-transparent, the colour a lovely delicate green, the abdomen rather yellowish; just in the spiracular region there runs all round the body a stout pink rib,



53. Wood White (*Leucophasia Sinapis*). Upper side. The upper figure is the Male: the middle figure the variety *Diniensis*: and the lower figure the Female.



Under side of Male.

enclosing the greenish spiracles; from this a strong pink line branches off, bordering the outer edge of each wing-case; and the wing-rays themselves are delicately outlined in pink. I received some eggs on August 2nd, and again on September 1st. The caterpillars appeared respectively on August 8th and September 6th; full fed on September 26th and November 8th; in chrysalis September 29th and November 8th. The food chosen was either the tufted vetch (*Vicia cracca*), or the tuberous-rooted bitter vetch (*Orobus tuberosus*), but not both.—*Hellins.*

Time of Appearance.—May and August.

Localities.—It is to be seen languidly flying along the roadways and pathways in woods, rarely entering the umbrageous shelter of a wood, and as rarely venturing into open country. I have never seen it settled, and one of our oldest entomological authorities has made the same observation. At Darent Wood, in Kent, I have often watched its characteristic flight: one specimen will make its appearance, approach as it were on wearied wing, and if unmolested, pass by and go on out of sight; in a few minutes another will appear at the same spot, will follow the exact course of the first, and press onward in the same direction, and so on during the whole of a summer's morning, each seemingly bent on the performance of some inexorable duty, in which, however, dispatch or hurry was totally out of the question. In Ireland it seems very irregularly distributed. Mr. Birchall says it is abundant near Galway and at Killarney, but has not been noticed in Ulster or Leinster. The Hon. Emily Lawless says it is not uncommon at Florens in the county Galway, and that it has also been taken at Dunsandle and other places in the neighbourhood of Athenry. It has not been recorded as occurring in the Isle of Man or in Scotland. In England and Wales it is of frequent, and sometimes of abundant, occurrence.

Berkshire. At Burghfield, near Reading—*C. S. Bird.*

Cornwall. Launceston—*W. H. Hayward.*

Cumberland. Very rare; only occasional specimens have been taken at Barron Wood and Newbiggin Wood. I have heard that it is more frequent about Ullswater in the Lake District—*J. B. Hodgkinson.*

Devonshire. Plym-bridge, Shaugh-bridge, Berry Pomeroy, Torquay, Exeter, Axminster, Chudleigh, Buckfastleigh—*J. J. Reading.* This elegant butterfly has been extremely abundant during the latter part of last month (May), and up to the present time (June 13), in the neighbourhood of Ipplepen, South Devon. It does not appear to be confined to any particular locality, or to its usual resort of woods, being generally distributed, and occurring in almost every lane and hedge-row in this neighbourhood—*F. Wilkinson*, in "*Entomologist*," vol. v., p. 114.

Dorsetshire. Glanville's Wootton, Parley, Lulworth—*J. C. Dale.*

Essex. Single specimens have been recorded from several localities.

Glamorganshire. One specimen at Llantrissant—*Evan John.*

Gloucestershire. Rather scarce in the paths in woods, in lanes, &c., in Alderley Down Woods—*V. R. Perkins;* Dursley and Grange Court—*Joseph Merrin.*

Hampshire. New Forest, &c., &c.

Herefordshire. One specimen at Grantsfield near Leominster—*Mrs. Hutchinson*, Briarly Wood, Eton Wood—*E. Newman.*

Huntingdonshire. Monk's Wood—*F. Bond.*

Kent. Blean Wood—*H. A. Stowell;* I have occasionally taken it near Sturry and near Tunbridge Wells—*W. O. Hammond;* formerly very common in Darent and Birch Woods—*E. Newman.*

Lancashire. Abundant at Grange—*J. B. Hodgkinson;* common in the county on the north side of Morecambe Bay—*T. H. Allis;* Silverdale—*James Murton.*

Monmouthshire. Scarce, and only taken in St. Julian's Wood—*George Lock.*

Northamptonshire. Peterborough—*F. Bond;* near Towcester—*Hamlet Clark;* Barnwell Wold in May, but not common—*William Bree.*

Nottinghamshire. A single specimen has been taken at Newark—*George Gascoyne.*

Staffordshire. Swinnerton Old Park—*T. W. Daltry.*

Suffolk. Brandeston and Playford—*Joseph Greene;* Stowmarket and Bentley — *H. H. Crewe.*

Surrey. Common at Haslemere—*C. G. Barrett.*

Sussex. Bolney Wood — *W. Buckler;* Frenchlands Woods, Ashington — *J. H. White;* Abbot's Wood, near Hailsham: the first brood in May, the second in August—*C. V. C. Levitt.*

Westmoreland. Abundant at Witherslack, and not rare at Windermere—*J. B. Hodgkinson.*

Wight, Isle of. Near Brading, but rare in the Isle of Wight—*F. Bond;* Quarr Copse and Appledurcombe Parks—*Alfred Owen;* very local in the Isle of Wight: I only know of one locality, at Whippingham — *James Pristo.*

Wiltshire. *Sinapis* has been taken in Savernake Forest and Rabley Copse; also at Great Bedwyn, but very rarely—*T. A. Preston;* common at Wilton, near Salisbury—*W. H. Grigg.*

Worcestershire. It occurs sparingly in all the woods in which I have collected—*J. E. Fletcher;* formerly plentiful at Great Malvern, but not so now; the second brood is less abundant than the first—*W. Edwards;* Bromsgrove—*W. H. Braper.*

From the careful county lists, kindly transmitted me from Cheshire, Derbyshire, Hertfordshire, Lincolnshire, Middlesex, Norfolk, Shropshire, Somersetshire, and Warwickshire, the name of *Sinapis* is absent: a fact not proving, perhaps, the absence of the insect, but showing certainly that it is not common.

54. ORANGE-TIP. — All the wings are rounded, and the costal margin of the fore wings is slightly arched: the colour is white, with a dark gray tip and a central black spot. In the males there is a large patch on each fore wing, extending from the gray margin to the central spot, and occupying about half the wing, of a most brilliant orange red: in the female this is wanting, but the dark gray tip



54. Orange-tip (*Anthocharis Cardamines*). Upper side of Male, Upper side of Female, Under side of Male.

and central spot are larger and more conspicuous in that sex than in the male; the central spot in the female is also decidedly crescentic. The under side of the fore wings in the male has the orange-coloured blotch narrower than on the upper side, and the gray colour assumes the form of a hind-marginal band, and is sprinkled with minute yellow scales, which impart a greenish hue to this part: the under side of the hind wings in both sexes is exquisitely tesselated with smoky-gray spots on a white ground, the gray portions of the wing being powdered with yellow, which communicates to them a greenish tint.

Varieties.—I have a specimen of this butterfly in which the whole of the ground colour is a beautiful canary yellow, and I believe there are several others. Abnormities, in which the orange blotch occurs on only one of the fore wings, or only on the upper side or under side, sometimes occur; they find great favour in the eyes of collectors.

LIFE HISTORY.—The female lays her EGGS

or hedge garlic (*Erysimum alliaria*), dame's cress (*Hesperis matronalis*), tower mustard (*Turritis glabra*), winter cress or yellow rocket (*Barbarea vulgaris*), and occasionally on lady's smock (*Cardamine pratensis*), as stated by Mr. Doubleday, who observes, with his usual care, that in this instance the greater part of the caterpillars must perish when the meadows are mowed, as the plant is cut down with the grass before they are full-fed: it is very probable also that other species of cruciferous plants are occasionally selected in the absence of those mentioned above, but I know of no others which have been noticed in England. When the young CATERPILLAR emerges from the egg it makes its way up the flowering-stalk, and as soon as the pods have formed begins devouring them: at first it requires but little food, and the pods, growing with great rapidity, fully keep pace with its requirements, and furnish an abundant supply. It is curious to observe with what pertinacity these caterpillars, in confinement, select the pods and neglect the leaves of these plants, and, having watched their proceedings with great attention, I have fancied they devoured the seeds with peculiar relish: sometimes a pod will be pierced exactly over each seed, and the seeds themselves consumed, the pod being neglected until the supply of the more favourite viand had failed. When full-fed, which is during the first week in July, the caterpillar rests in a nearly straight position on the stalk or seed-pod of its food-plant: the head is then of exactly the same breadth as the second segment, and the body of nearly equal breadth throughout, but slightly attenuated towards the anal extremity, which is rounded; the dorsal surface is convex, transversely and regularly wrinkled, the wrinkles dividing each segment into sections; the sides are slightly dilated below the spiracles, and the ventral surface slightly flattened; every part of the head and body is beset with minute warts, and each wart emits a short bristle. The colour of the head and body is opaque glaucous green, this colour on each side of the body fading through pale glaucous green into white, the extreme margin of the lateral dilatation being pure white, and constituting a lateral stripe which has its upper or dorsal margin very indistinctly defined, but its lower or ventral margin abrupt and well marked; this white stripe encloses the very pale spiracles, and extends the entire length of the caterpillar, commencing at the ocelli close to the mouth, and terminating at the rounded extremity of the anal flap; the ventral surface, legs and claspers, are dark-apple-green; the warts on the dorsal surface are intensely black, and also many of those on the sides and ventral surface, but in these regions there occur white warts also, more especially within the white lateral stripe; the bristles which they emit are black on the dorsal, and generally black also on the ventral surface, but on the lateral stripe they are mostly white. In July the caterpillar ascends the stem of its food-plant, and, fastening itself thereto by a belt round the middle, changes to a crescent-shaped CHRYSALIS of very eccentric appearance, both extremities being elongated and pointed, and the anterior elevated in the air, the posterior firmly attached by a series of minute hooks to a silken film, previously spun on the stalk of the food-plant; the back is concave, the wing-cases protruding and forming a semicircular arch in the centre of the ventral surface; the colour is pale dingy green, approaching to wainscot-brown: in this state it remains throughout the winter.—*Newman.*

TIME OF APPEARANCE.—May.

LOCALITIES.—Meadows and lanes everywhere in the three kingdoms, as well as in the Isle of Man. Mr. Birchall says it was common in May, 1860, and that he observed it in myriads at Sligo, reminding him of the migrating clouds of tropical *Callidryas*; Mrs. Battersby says it is very common in Ireland, and Mr. Fetherstonhaugh that it is abundant in the counties of Dublin and Mayo; according to Dr. Buchanan White, it is widely distributed in the lowland part of country, and occasionally is rather common: it has not been found north of Forres; the dates on which Dr. White has taken it in Perthshire are as follows—In 1858, May 15;

1859, May 14; 1860, May 24; 1866, May 2; and 1868, May 16. Dr. White has taken it in Kirkcudbrightshire in June and July, also in Fifeshire and Morayshire; Mr. Wailes, in his "Northumberland and Durham Catalogue," observes:—"This beautiful butterfly is generally distributed over the two counties, frequenting damp places in fields, lanes, and woods, during May and June, where the principal food-plant of the caterpillar—*Cardamine pratensis*, of which it devours the seed-vessels—occurs. This year, 1857, on the 4th June, in the vicinity of Callaly, I observed its simultaneous occurrence in great numbers throughout that district, when not a single specimen was to be seen the day before." Mr. Wailes adds this curious observation:—"The usual expansion of the wings is one inch and eight lines to one inch and eleven lines, but in the year 1832 none exceeded one inch and three lines; and so marked was the difference all over the country, that many were inclined to consider the specimens as those of a distinct species. The following season there was no departure from the normal size." In Gloucestershire this variation in size has been noticed by Mr. V. R. Perkins both in male and female. The name does not appear in a list from Lincolnshire, most kindly sent me by the late Thomas Henry Allis very shortly before his last illness: it is the only county list from which it is totally absent; but if I understand Mr. Jenner Fust's paper on the "Distribution of Lepidoptera in Great Britain," he has an authority for the occurrence of *Cardamines* in that county.

55. Green Chequered White.—The fore wings are blunt, but scarcely rounded at the tip; the hind margin of all the wings is simple. The colour is white, the fore wings having a broad blotch of smoky-black at the tip, and in this are four squarish white spots; there is a double transverse and rather oblique smoky-black spot above the middle of the costal margin, descending nearly to the middle of the wing, and a smaller round black spot near the anal angle: the hind wings are somewhat clouded with smoky-black, more particularly a transverse band parallel with the hind margin, and there are usually four or five arrow-heads still nearer the hind margin, which, by their stems, are united to this band. On the under



55. Green Chequered White (*Pieris Daplidice*). Upper side of Male and Female.



Under side of Female.

side all the markings of the upper side are not only present on the fore wings, but distinctly defined, and are of a yellowish green colour, minutely sprinkled with black: the hind wings are beautifully tesselated with greenish markings, as represented in the lowest figure of the three.

Life History.—The egg is laid on the two species of wild mignonette (*Reseda lutea* and *R. luteola*) in April or May, and again in August or September, there being two broods

in the year, the second of which passes the winter in the chrysalis state. The head of the CATERPILLAR is rather narrower than the second segment of the body, and when at rest is partially withdrawn therein; the body is uniformly cylindrical, the segments being perceptibly but not strongly marked. Its entire surface is covered with scattered warts, each of which emits a hair: the colour of the head is bluish gray, with a longitudinal yellow mark on each cheek; the body is of the same bluish gray colour, with four yellow stripes, two of which, rather broader than the others, are dorsal and commencing at the head, where they unite with the two yellow marks already noticed, terminate on the thirteenth segment; the other two stripes are lateral in the region of the spiracles; the warts are black. The CHRYSALIS is attached by a belt, and also by anal hooks; the head is pointed; the thorax is keeled, and the sides keeled and angulated; the colour is pale brown, with several spots of darker brown or black on the body.—*Hubner's figures.*

TIME OF APPEARANCE.—May and August. The August specimens only are taken in this country.

LOCALITIES.—Unrecorded as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems to be almost entirely confined to the coasts of Kent and Sussex opposite the northern coast of France. A theory broached by myself very many years ago, and severely ridiculed by many of our entomologists, under the name of the "blown-over theory," suggested that we may be indebted to winds, or the migratory propensity of insects, for the few specimens taken in this country of such species as *Chærocampa Nerii*, *Lampides bœtica*, and *Pieris Daplidice*. This theory may, I think, fairly challenge investigation, notwithstanding the unquestionable fact to be presently adduced of the species having been raised from the egg in this country. I believe it is generally safer to investigate a theory based on long experience than to dismiss it as unworthy of consideration. *Daplidice* has been reported from the undermentioned counties:—

Cambridgeshire. I took a fine specimen near Whittlesea Mere on the 22nd or 23rd of August, 1852, while at rest on the flower of the wild carrot—*E. C. Buxton.*

Devonshire. At p. 398 of the second volume of the "Zoologist," Mr. Lighton says, "My cabinet has lately been enriched by a specimen of *Daplidice* captured in 1836 in Roseberry Wood, near Exeter, by Mr. R. Dawson."

Essex. One was taken by Mr. Norman Halls, near Dilbridge Hall, Colchester, on the 12th August, 1857—*W. H. Harwood.*

Hampshire. Portsdown Hill — *H. H. Crewe.*

Kent. At p. 113 of the first volume of the "Zoologist," the Rev. W. T. Bree, once a great authority in entomological matters, writes thus:—"Mr. Leplastrier, of Dover, captured last summer, near that place, two pairs of the rare *Pieris Daplidice*. One of these, fortunately, laid some eggs after it was captured, and from them Mr. Leplastrier reared the caterpillars which he fed on the wild mignonette (*Reseda lutea*), and at the present time (Feb. 8, 1843) he has four of them in the chrysalis state. The chrysalis, to my eye at least, a good deal resembles some of the *Vanessidæ*, were it not that, unlike them, it is fastened by a thread round the middle. Mr. Leplastrier's specimens were taken, I think, the end of July, or early in August, and if so, it would seem there must be two broods in the season." On the 18th of May of the same year, Mr. Leplastrier writes thus to Mr. Bree:—"I have the pleasure of fulfilling my promise, by informing you of the safe arrival of my four specimens of *Daplidice* last week, and certainly they are a splendid-looking insect, and, of course, in fine condition: there are three females and one male." Mr. Bree adds:—"The above notice may not, perhaps, be wholly without interest to your entomological readers, as it serves to point out with precision the date when this rare insect makes its first appearance on the wing."

Lyminge, six miles north of Hythe—*William Tylden.*

Margate, 1858 and 1868—(Mrs.) *Julia Cox.*

Captures near Margate, Ramsgate, Deal, Dover, and Folkestone, have frequently been made and recorded. Gravesend, one in 1870 —*D. T. Button.*



56. Greenveined White (*Pieris Napi*). Upper side of Male and Female.



Under side of Female.

56. GREENVEINED WHITE.—The tip of the fore wings is blunt but scarcely rounded; the margins are simple: the colour is white with smoky-gray tips to the fore wings, and a slight blackness at the extremity of each wing-ray; there is one spot on the disk of the fore wings in the male and two in the female; these spots are nearer the hind margin than the middle of the wing: in the female also the hind wings are more or less suffused with smoky-gray, more especially along the wing-rays. On the under side the tips of the fore wings and the whole of the hind wings are yellow; the disk of the fore wings is white; the wing-rays are of the ordinary ground colour, but are bordered with black scales

Varieties.—Mr. Buckler remarks that all the caterpillars of this insect which fed on water-cress produced very pretty varieties of the perfect insect, the usual dusky markings of the wings being of a delicate dove-gray, the bases of the wings being more than usually suffused with this tint. Mr. Stephens divided this species into three, distinguished by the greater or smaller amount of smoky gray on the wings; he called them "*Napi*," "*Napeæ*," and "*Sabellicæ*;" but no entomologists with whom I am acquainted adopt this division.

LIFE HISTORY.—This butterfly is double-brooded: the EGGS which produce both broods are laid on the hedge garlic (*Erysimum alliaria*), on the water-cress (*Nasturtium officinale*), on the winter-cress (*Barbarea præcox*), and probably some other species of cruciferous plants: the EGGS which produce the first brood of caterpillars are deposited in April and May; those which produce the second, in July and August: their figure is that of a sugar-loaf, but beautifully ribbed longitudinally, and delicately striated transversely; they are attached by the base. The CATERPILLARS emerge about the twelfth day, and are full-fed respectively at the end of June and middle of September, when they rest in a straight position, closely appressed to the food-plant. The head is small, decidedly narrower than the body; the body is cylindrical, but tapers slightly to each extremity; the dorsal surface is transversely wrinkled, the wrinkles dividing each segment into six sections; both head and body are beset with minute warts or points, each wart emitting a hair. The colour of the head and dorsal surface is dull and rather dark glaucous green; the ventral surface is lighter, the division between the two being very distinct, and taking place at the spiracles, which are black and enclosed in a bright yellow ring: the warts on the head are generally white, those on the dorsal surface almost invariably black, and those on the ventral surface almost invariably white; the legs and claspers are of the same tint as the body, but semi-transparent. Mr. Greening kindly supplied me with the eggs of this species, and Mr. Buckler with the full-fed caterpillars: the latter spun

a delicate web over the surface of a leaf early in July, attaching themselves thereto by the anal extremity and also by a belt passing over the body behind the thorax, and thus changed into CHRYSALIDS, having the head rather elevated and terminating in a slender point. The thorax is produced into a slender, medio-dorsal keel, angulated in the middle; the sides of the sixth and seventh segments are keeled and angulated, the seventh more prominently so than the sixth; the following segments have a medio-dorsal keel very little raised, the continuity of this with the thoracic keel is interrupted on the sixth and seventh segments. The colour is green, fading on the approach of emergence to whitish, minutely dotted with black; the keel of the thorax and the lateral keel of the sixth and seventh segments are yellow, crested with pinkish brown, the posterior angle of the latter is tipped with black. I believe that this species never feeds on the various species of *Brassica*, *Tropæolum* and *Reseda*, frequented by its congener, *Pieris Rapæ*, and I also think that the accounts of its destructive powers are entirely fabulous.—*Newman.*

TIME OF APPEARANCE.—May and August.

LOCALITIES.—Mr. Birchall reports that this butterfly is generally distributed in Ireland, and that it occurs in the Isle of Man; it seems to occur generally, but in some places not plentifully, in Scotland and England.



57. Small White (*Pieris Rapæ*). Upper side of Male.

57. SMALL WHITE.—The fore wings are somewhat arched on the costal margin, the tip being somewhat pointed, but not acutely so, and the hind margin simple and entire; the hind margin of the hind wings also is simple and entire. The colour of the wings is white, but the fore wings of the male have a smoky-gray tip, and a faint median spot of the same colour; the hind wings have an inconspicuous black spot on the costal margin. The females have a distinct dark smoky spot at the tip, and two black spots on the disk,



Upper side of Female.

one nearly circular somewhere about the centre of the wing, the other almost double, and nearer the anal angle. The under side has the tip of the fore wings and entire area of the hind wings dull ochreous yellow, the darker markings of the upper side being apparent, but indistinct.

Varieties.—A very variable species as regards the amount of black marking on the upper side of the fore wings. In some specimens, in one particularly which was sent me by Mr. Fetherstonhaugh, of Dublin, the black markings are totally absent. Mr. Stephens, grounding his characters on this difference, divided the species into two, calling the vernal specimens "*Metra*," the later or autumnal specimens "*Rapæ*." At p. 258 of the fourth volume of the "Entomologist," Mr. J. M. Bramwell describes a specimen, taken while settled on some palings near Perth, as of a uniform dusky brown colour on both sides of the wings. Lastly, there is a variety of exquisite beauty occasionally but very rarely taken in this country, of the most delicate but vivid yellow. It will be seen farther on that this variety occurs more commonly in Canada.

LIFE HISTORY.—This butterfly is double-brooded: the eggs which produce both broods are laid on all the cultivated varieties of cabbage and garden plants, the *cruciferæ*, tropæolums, and mignonette having the

preference. Those designed to produce the first brood of caterpillars are deposited in April and May, those for the second brood in July and August: the shape of the EGGS is that of a sugar-loaf, beautifully ribbed longitudinally and delicately striated transversely, the number of ribs in the specimens I counted being ten, eleven, and twelve; the number of striæ I believe inconstant; it is scarcely ever less than thirty, and these, being crowded into so small a space, are, of course, difficult to count: the eggs are attached by the base only, and always on the upper side of the leaf. The young CATERPILLARS of the first brood are hatched about the thirteenth day, and those of the second brood about the tenth day, but this depends very much on temperature; they are often observed eating the eggshell even before quitting it. Until the second change of skin the caterpillars are exactly the colour of the leaf, and semi-transparent; the hairs are conspicuous, and each has a spherical head like a pin; indeed, they much resemble so many minute pins stuck into the skin, or still more exactly those minute stalked glands which are commonly observed in the stalks of ferns and other plants. There are a number of white warts on the body much more conspicuous at this early stage than in after life; these are three in number on each side of each segment in the middle of the body, but not at the extremities. The caterpillars are full-fed in about twenty days, and this also depends on the temperature, which in this climate is proverbially uncertain during the summer season: when full-fed they rest in a perfectly straight position and with the ventral surface closely appressed to the leaf; they crawl with a gliding undulating motion, and, if removed, roll themselves in a ring—a position they rarely maintain longer than a few seconds: the head is rather narrower than the second segment, and decidedly narrower than the following segments: the body is cylindrical, but tapers gradually towards both extremities; the incisions between the segments are very indistinct, but each segment is transversely wrinkled or divided into six sections; both the head and body are beset with minute points or warts, each of which emits a short and feeble hair. The colour of the head and dorsal surface of the body is a rather dark glaucous green; the ventral surface is lighter and more decidedly glaucous. The division between the two tints occurs in the region of the spiracles; there is a narrow medio-dorsal stripe of gamboge yellow, extending from the head to the commencement of the anal flap; there is also a lateral series of bright yellow spots in pairs, the anterior spot of each pair is contiguous to a spiracle; the warts are black, with the exception of three dorsal pairs on each segment, which are white. The CHRYSALIDS are attached by a belt and also by minute hooks at the anal extremity; they are readily to be found thus attached to the woodwork in greenhouses, to wooden frames, walls, trunks of trees, and all manner of out-houses; the head is very convex beneath, and terminates in front in a very sharp point directed forwards; the thorax is produced into a slender medio-dorsal keel, angulated in the middle; the sides of the sixth and seventh segments are keeled and angulated, the seventh much more prominently so than the sixth. The following segments have a medio-dorsal keel very slightly raised on the thirteenth segment; this is divided, and the divisions spread to the bifid anal extremity. The colour of the chrysalis is very different in different specimens; the majority are of that pale whitey-brown which I have called putty colour; some are wainscot-brown; others red-brown; and others again are delicate green of different shades. The entire surface of the chrysalis is spotted, sprinkled, or striated with black. An ingenious but, I think, futile attempt, has been made to show that the colour of the chrysalis varies with the colour of the object to which it is attached.

TIME OF APPEARANCE.—Summer, from April to August, but especially abundant in May and August: sometimes as abundant as snow-flakes, sometimes scarce. In 1868 it was difficult to procure a specimen, and this fact was the subject of general observation and of many remarks in the fourth volume of the "Ento-

mologist," pp. 300, 313, 314, &c.; the scarcity seemed to extend all over the kingdom. At page 80 of the fourth volume of the "Entomologist," the Rev. T. A. Preston records the occurrence of a white butterfly on the 24th of February, and of a second on the 4th of March: it would be useless to speculate on the species, but *Rapæ* is the most probable of the three.

Obs.—At nine in the evening of the 16th July, 1868, when returning from a visit to my friend Mr. Kirchner, who has so exquisitely engraved my moths and butterflies, I saw a number of small white butterflies on a railway bank, flying from one clump of lucerne to another, and sipping the honey of the blossoms: they were doubtless of this species.

Localities.—Appears to be universally distributed throughout the United Kingdom. It is very partial to settling on damp ground. Curious instances are recorded of its following water-carts in London in swarms, and settling on the fresh watered streets.

Obs.—This butterfly is rather remarkable for the manner in which it has been observed migrating. At page 1443 of the fourth volume of the "Zoologist," I have extracted the following from the "Canterbury Journal:"—"One of the largest flights of butterflies ever seen in this country crossed the Channel from France to England, on Sunday last (the 5th July, 1846). Such were the density and extent of the cloud formed by the living mass, that it completely obscured the sun from the people on board our Continental steamers; the decks were strewed with the insects in all directions. The flight reached England about twelve at noon, and dispersed themselves inland and alongshore, darkening the air as they went. During the sea-passage of the butterflies the weather was calm and sunny, with scarcely a puff of wind stirring; but an hour or so after they reached *terra firma* it came on to blow great guns from the south-west, the direction whence the insects came." Another newspaper account says: "On Sunday last (5th July, 1846), there was a most extraordinary arrival of white butterflies at Dover; every vessel that came into harbour had the rigging and decks completely covered with them, and the pier was so thick in butterflies that you could not walk without treading on them." At the same page of the "Zoologist," the Rev. J. Pemberton Bartlett gives the following account:—"On the 7th of July (1846), I was surprised by the very unusual number of white butterflies which appeared in our garden here, and in order to protect the rising generation of cabbages and broccoli, I commenced an attack upon them with my net. In about an hour I killed upwards of a hundred, but this not appearing materially to diminish their number, I desisted from the work of destruction. The next day they were as numerous, and I began to suspect that they had migrated, as it was difficult to account for so simultaneous an escape from the chrysalis state of so vast a number in our own immediate neighbourhood. I have since been informed that on Sunday, the 5th of July, an extraordinary flight of white butterflies arrived at Dover from the French coast. It was described as being so extensive as to pass like a cloud of snow. The decks of several vessels were covered with them; they came in a south-west direction." The distance between Mr. Bartlett's residence and Dover is ten miles.

Another and totally different instance of the colonizing or acclimating power of this butterfly will be found at page 9371 of the "Zoologist" for 1864: this paper, which is certainly one of the most valuable and interesting contributions to the science of entomology ever published, is from the pen of Mr. G. J. Bowles, Secretary of the Entomological Society of Canada, Quebec Branch; and although it is too long to transfer entire to these pages, the introductory paragraphs are of such importance in an economic and commercial point of view, that I cannot hesitate to insert them here; omitting, however, the author's valuable observations on the possible mode of introduction. "During the summer of 1863," says Mr. Bowles, "I captured, in the vicinity of Quebec, numerous specimens of a butterfly of which no description could

be found in any work on American entomology; Mr. Couper, to whom I applied for assistance, was equally at a loss to determine the species, considering it, as I did, to be indigenous to Canada. In order to solve the problem, however, we forwarded some specimens to Mr. William Saunders, of London, C.W., who pronounced them to be identical with *Pieris Rapæ*, the small white butterfly of England, one of the most common and injurious lepidopterous insects of that country. In the meantime I had enclosed a drawing of the butterfly, together with the wings, to Mr. S. H. Scudder, of Boston, from whom I received a reply stating that, after comparing the drawing and wings with specimens of *P. Rapæ* in the Museum of Comparative Geology at Cambridge, he saw no reason to consider them distinct; at the same time he desired further investigation to be made respecting the caterpillar and chrysalis states of the insect. This investigation has been successfully carried out, and places beyond doubt the identity of the butterfly with the English *P. Rapæ*, thus establishing another instance of the transportation of a lepidopterous insect across a wide expanse of ocean, and its naturalization in a new country—an instance which, when the evidence is considered, must be regarded as the most conclusive on record. The identity of the English and Canadian species is thus proved by the exact similarity of the two insects in all their stages. That the perfect insects are alike in both sexes I have on the authority of the gentleman above named, for in Quebec I could have no opportunity of comparing specimens taken in both countries. It is singular, too, that a curious variety of the male is common to both; in Canada, however (perhaps from the effect of a different climate), it is more frequently met with than in England. Two males of a bright canary colour, but with the usual markings of the species, were captured here last summer, one by Mr. Couper, the other by me; and this season I have already seen several similar individuals. On referring to a valuable work in the library of Parliament ('Curtis's Farm Insects,') I was gratified to find that the author mentions having in his collection a male *P. Rapæ*, 'taken near Oldham, in Lancashire, which had all the wings of a bright yellow colour.' As to the chrysalis, in size, colour, and markings, it exactly agrees with engravings and descriptions of the English chrysalis, and also in its usual place of deposition, &c. The last link in the chain is furnished by the similarity of the caterpillar, which also agrees with the best English descriptions. I took several of these caterpillars from cabbage plants in hot-beds on the 8th of June, and have reared four of them to maturity. When about half-grown they began to exhibit the characteristic markings of the species, these markings becoming more decided as they increased in size. That this insect is not native to Canada is certain from two interesting circumstances connected with its history. A limit can be set to its existence in Canada, and the place where it first appeared can be specified. Until within a few years the butterfly was unknown in this country. No description of it is found in Kirby's 'Fauna Boreali-Americana,' nor in the 'Canadian Naturalist' by Gosse, who visited Quebec and collected here about 1839. The 'Synopsis of the Smithsonian Institution' is also wanting in this respect; and I have carefully examined the volumes of our magazine of natural history ('The Canadian Naturalist,' Montreal), without finding any notice of the species. This periodical contains two lists of *Lepidoptera* collected in Lower Canada, one by Mr. R. Bell, jun., of butterflies taken on the Lower St. Lawrence; the other, by Mr. D'Urban, of those found in the vicinity of Montreal in 1857, 1858, and 1859. The only *Pieris* mentioned in these lists is *P. oleracea*, a species which may be distinguished at a glance from *Rapæ*, the markings being altogether different. Mr. Couper captured a specimen of *Rapæ* within the city limits of Quebec, about five years ago, but did not investigate the subject, though considering the insect a rare one, his special study being *Coleoptera*. This is the earliest notice of the butterfly in Canada; and it evidently points

out Quebec as the locality of introduction, and fixes the period at about seven or eight years ago."—"*Zoologist*," 1864.

These highly interesting facts may reasonably excite the inquiry whether *Antiopa* *Atalanta*, and many other insects, have not migrated in the same way from continent to continent, and whether man may not have been instrumental, however unwittingly, in aiding the migration.



58. Large White (*Pieris Brassicæ*). Male and Female.

58. Large White.—The fore wings have the costa arched, the tip pointed, but not acutely so, and the hind margin simple and entire; the hind wings have the margin simple and entire: the colour is white, but the fore wings have a broad smoky black tip, which diminishes almost to a point on the costal as well as on the hind margin; the females have, in addition, three black spots, one of them nearly circular and nearly central, another also nearly circular between this and the inner margin; the third is club-shaped and inner-marginal, the tip of the club almost touching the second circular spot, and the slender end of the club extending along the inner margin more than halfway towards the base of the wing: the hind wings have a black spot about the middle of the costal margin. The under side has the disk of the fore wings white with a yellow-gray tip and two black spots, corresponding with those on the upper side of the female; the hind wings are dull yellowish-white sprinkled with black scales.

Varieties.—At p. 471 of the second volume of the "Zoologist," Mr. J. Plant, of Leicester, figures a variety of this butterfly with a sharply-defined black patch at the base of all the wings. At p. 258 of the fourth volume of the "Entomologist," Mr. J. M. Bramwell, of Perth, mentions that he has in his collection a curious specimen of this butterfly captured in 1868, about two miles from Perth. It is a female, and of a uniform dusky black colour, both on the upper and under sides; the black spots on the wings are quite distinct, being of a much more intense and shining black than the ground colour. I ought also to mention that Mr. Stephens, in his "Illustrations of British Entomology,' makes "species" of the two broods of this

butterfly, calling the early or vernal brood "*Chariclea*," the later or autumnal brood "*Brassicæ*." The vernal brood has gray tips to the fore wings, whereas in the later brood they are black.

LIFE HISTORY.—The EGGS are laid in May, and again in July, sometimes singly and sometimes in little clusters, varying in number from four or five to a dozen. In shape they somewhat resemble a champagne bottle which has had the upper part of its neck knocked off; they are firmly attached by means of a gummy secretion elaborated within the body of the parent to the surface of the leaf selected, which in this country seems to be almost invariably one of the cultivated varieties of cabbage. The attachment is by the base only, and the egg stands erect like a ninepin; it has twenty or twenty-two longitudinal ribs, and between thirty and forty most delicate transverse lines, which pass over the ribs themselves, as well as the interstices between them. The CATERPILLARS of the first brood usually hatch in fifteen days, those of the second brood in ten days: they feed exactly on the spot where the egg was laid; if in a cluster they remain in company until the second change of skin, first, however, consuming the shell of the egg from which they have just escaped. The caterpillars are full-fed in about a month, seldom less, the period varying in accordance with the temperature; they rest on the surface of the cabbage leaf in a nearly straight position, and if disturbed fall to the ground, bending the two extremities towards each other; but they retain this position for a short time only, and then turning with unerring certainty to the food-plant from which they have fallen, reascend the stalk. The head is narrower than the second segment, into which it is partially withdrawn when the caterpillar is at rest; it is rough with numerous warts of various sizes, each of which emits a hair. The body is uniformly cylindrical, the divisions of the segments not being strongly marked, but yet distinctly discernible, and each segment is transversely divided into four sections in addition to a double skinfold between each two, thus imparting the idea that the number of sections in a segment is six. Each section has a series of wart-like projections of various sizes, which give a rough appearance to the surface, and each of these projections emits a hair from the summit. The colour of the head is bluish-gray, the plate above the mouth being ochreous, and the warts or projections black. There is a large black mark down the middle of the face which divides on each side of the ochreous plate already described, and also a black blotch in which are situated the ocelli on each side of the mouth. The colour of the body is bluish-green, with three yellow stripes, the narrowest of which is medio-dorsal, the others lateral, and including the spiracles; these three stripes, although very obvious, have no clearly-defined margins, and seem to melt into the blue-gray ground-colour. The warts or projections are entirely black, and, in many instances, form the nucleus of a small black blotch; these, occurring only or principally on the blue-gray area, give a greater distinctness to the stripes of the caterpillar. The hairs are mostly white; the ventral surface, including the legs and claspers, is dull yellow-green. The CHRYSALIS is attached by a belt round the waist, as well as by the anal extremity, which is forked or divided, the notch between the divisions being fringed with minute hooks. The head is pointed; the back is keeled, and rises into a sharp point in the middle of the thorax; the sides are also irregularly keeled, the keel rising into two points or lobes on each side of the body close to the margin of the wing-cases. The colour is bluish-white, abundantly sprinkled with black spots; the point of the head is yellow, the median line of the dorsal keel also yellow, but interrupted, especially at the junction of the segments, by a black spot on the body; each of these black spots encloses a smaller white spot.—*Newman.*

TIME OF APPEARANCE.—May to August; particularly these two months.

LOCALITIES.—In all parts of the United Kingdom more or less plentiful. This, like the preceding species, has strong migrating propensities. At page 289 of the second volume

of the "Entomologist," Mr. Thorncroft has published the following interesting observations on the subject :—"It was a still, hot day, with hardly a breath of air, and now and then the common *Brassicæ* and *Rapæ* would lazily fly in. The flood-tide set in about 3 p.m. with a gentle breeze, and then came a host of the above-named butterflies, with a few of *Napi*. There must have been hundreds arrive within a very short space of time; but what surprised my friend and me was their alighting or settling on the sea with expanded wings, and the ease with which they rose again. We saw the same butterfly settle and rise again as many as four or five times, within a distance of less than a hundred yards, and with apparently as much ease as on land. They all came direct in from the sea from a south-westerly direction, and seemed to aim for the entrance of the harbour between the piers, though there were plenty of them came on shore on each side of the piers. The shore was covered with a coarse sort of rye-grass, on which they were resting when we returned home, and in walking through the tall grass they rose in myriads." If *Napi*, *Rapæ*, and *Brassicæ* cross the Channel with so much ease, why not *Daplidice*?



59. Black-veined White (*Aporia Cratægi*).

59. Black-veined White.—All the wings are rounded, and the edges entire and without fringe; they are very sparingly clothed with scales, those of the females being semi-transparent; the colour is white, all the wing-rays in the male being black, but in the female the three principal wing-rays of the fore wings are pale brown; every wing-ray is accompanied by a vague triangular smoky cloud where it joins the hind-marginal ray.

Life History.—The eggs are laid in June, in clusters, on the white thorn (*Cratægus oxyacantha*); and the young caterpillars, which are hatched in ten, twelve, or fourteen days, are of a very social disposition; by their united exertions they construct a silken tent, under which they reside in quiet during the sunshiny hours, but issue forth morning and evening to feed on the leaves of the hawthorn. On the approach of winter they quit this nursery and build a more substantial one, which is apparently waterproof, and under which they pass the winter, huddled together in the closest proximity, and abstain entirely from food, like many of our hybernating caterpillars of moths; here they remain until the expansion of the leaves in the spring, when they emerge, wander about, and eat voraciously, yet even then for some time they return occasionally to the protection of their silken domicile, but very soon separate for ever, and pass the remainder of their caterpillar existence in comparative solitude. Towards the end of May they are full-grown, and then fall from their food-plant on the least annoyance, rolled in a tolerably compact ring, but with the head slightly on one side. The head is about equal in width to the second segment: the body is almost uniformly cylindrical, the second and thirteenth segments being slightly narrower than the rest; almost every part of the head and body is clothed with hair. The colour of the head and second segment is dull smoky black; the shorter hairs of the head are black, the longer ones white: the dorsal surface of the body is black, with two bright rust-coloured stripes, composed of minute rust-coloured spots, each of which has a central black dot which emits a rust-coloured hair; these stripes are interrupted at the incisions of the segments when the caterpillar is crawling, but appear continuous when it is at rest: the ventral surface is gray, this colour extending above the spiracles, which are black; the division of the dorsal and ventral surface is abrupt and decided; the gray area is sprinkled

with innumerable minute black dots, and emits a great number of feeble whitish hairs: the legs are black and the claspers gray. About the middle of May the caterpillar spins a milk-white web over the surface of the hawthorn twigs, and, affixing itself to this, prepares for changing to a chrysalis, a compound silken cord being first attached to the sides. The CHRYSALIS has the head obtusely pointed, the back of the thorax is sharply keeled, and the shoulders prominent; the body has also a dorsal keel, and on each side a lateral keel, but neither of them is so prominent as that of the thorax; and the body terminates in a curved and flattened horn, which is furnished at the extremity with the usual hooks. The prevailing colour is yellowish white, varied with pure yellow and spotted with black; the brighter yellow is principally observable in the more salient points, as of the head and shoulders, and the lateral and dorsal keels of the abdomen; but in these latter it is interrupted and incontinuous; the black forms a broad continuous stripe down the ventral surface, including the cases of the head, legs, and antennæ; the wing-cases are yellow, bordered and spotted with black; the dorsal keel of the thorax is black, and the abdomen is abundantly spotted with black; the anal horn is yellow, with three longitudinal black marks.—*Newman.*

TIME OF APPEARANCE.—June and July: in perfection about midsummer.

LOCALITIES.—I believe this butterfly is unknown in Ireland, Scotland, or the Isle of Man: the name appears in Mr. Greene's Irish list, on the authority of a Mr. Hely, but neither Mr. Greene nor Mr. Birchall appears to have seen Irish specimens. In England we have many recorded localities.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

(Devonshire. Moreton—*Stainton's "Manual;"* not known now.)

(Dorsetshire. Glanville's Wootton, but I have not seen it for fifty-five years—*J. C. Dale.*)

(Glamorganshire. Formerly abundant, but I have not seen one for many years—*Evan John;* formerly abundant at Ynisygerwn, but not for many years—*J. T. D. Llewelyn.*)

Gloucestershire—Used to occur at Badgeworth—*Joseph Merrin;* near Bristol—*Alfred E. Hudd.*

Hampshire. Near Petersfield—*H. Harpur Crewe;* near Lyndhurst and Brockenhurst—*F. Bond;* Liphook—*C. G. Barrett;* New Forest—*J. C. Dale;* Southsea, Waltham—*Henry Moncreaff;* Emsworth—*W. H. Draper.*

Herefordshire. Formerly common at Eton Wood, near Leominster; I have seen it in cloudy weather settled almost by hundreds on the blossoms of the great moon-daisy (*Chrysanthemum leucanthemum*)—*E. Newman;* very rarely met with at Kimbolton—*Mrs. Hutchinson.*

Huntingdonshire. Monk's Wood on the 3rd of June—*H. Doubleday;* Monk's Wood—*F. Bond.*

Kent. Luddenham, Dimkirk, Shottenden, Selling—*H. A. Stowell;* most abundant at Herne Bay in 1858: we used, by way of amusement, to see how many we could catch at one stroke of the net; we often took four or five at a time: they appeared particularly fond of fields of broad beans—*H. Ramsay Cox;* local at Wingham; near Nonington, Sturry, uncertain in appearance—*W. O. Hammond;* in profusion at Strood—*Francis Latchmore;* Minster Lanes and Horne Park, near Ramsgate—*R. F. Turnbull.*

Monmouthshire. Common, its range extending from about a mile below Cardiff to a place called Llanwern, a distance of about fifteen miles—*George Lock.*

Northamptonshire. Barnwell Wold, and near Peterborough—*F. Bond;* near Towcester—*Hamlet Clark.*

Somersetshire. Clevedon, Worle—*Alfred E. Hudd.*

Sussex. At the Holmbush, between Henfield and Hurst; I have neither seen it nor heard of its being taken elsewhere in the county—*Edward Jenner.*

Wight, Isle of. Rare in the Isle of Wight—*F. Bond;* Quarr Copse—*Alfred Owen.*

Worcestershire. Great Malvern, scarce—*W. Edwards.*

2. CONCEALERS (in science CELANTES),

Of which the caterpillars hide themselves in a silken follicle or cocoon before changing into chrysalids.

Turning back to page 18, it will be seen that I propose to divide all butterflies into two primary groups, which I call Exposers (*Detengentes*) and Concealers (*Celantes*); the former undergo their transformation to chrysalids in the most open and exposed situations, and quite uncovered; the latter undergo the change concealed in a cocoon, after the manner of moths. In Britain the Concealers are few in number, of small size, and of very insignificant appearance; they are universally known amongst us by the name of "Skippers." In all our arrangements of British insects these merry little creatures seem out of place; that is, there is no continuity in any series which combines the Exposers and the Concealers, and I am perfectly aware that this which I am proposing does not remedy the defect; but an attentive study of exotic forms will show that the gulf between the two groups is not so wide as it appears to us who are acquainted only with our Skippers. Between the Exposers and the Skippers intervene three beautiful and interesting families of butterflies, called in scientific nomenclature *Doritidæ*, *Uranidæ*, and *Synemonidæ*; they have all the general superficial appearance of Exposers, combined with all the natural and essential characters of Concealers. One of *Doritidæ*, called *Doritis Stubbendorffii*, so exactly resembles *Aporia Crataegi*, that it might easily be mistaken for that insect; another, of which a representation is given at p. 175, has frequently been described and figured as British; and although I am unable to refer to any British specimen, and therefore cannot include it in a British list, I think there is no improbability of its occurrence on the Scottish Alps, so similar in character to the Swiss Alps, where it abounds; but at present the evidence, as given hereafter, is insufficient for my own satisfaction.

Family 12.—SKIPPERS (in science *Hesperidæ*).

The caterpillars are smooth, and have generally large heads and shuttle-shaped bodies; they feed on a variety of plants, but most frequently on leguminous species and grasses; when full-fed they spin silken cocoons among the leaves or stalks of their food-plants, and in these turn into chrysalids which are without angles, more or less pointed at the head, and slender and tapering at the other extremity: they are very active, wriggling when annoyed with great vigour; some have a slight attachment by the tail, but none are suspended or girted. The butterfly has six perfect legs, all of them formed for walking: the fore wings, when the butterfly is at rest, are held in a semi-erect position; I have never seen them appressed back to back, as is usual in the more normal butterflies; the hind wings are held horizontally, or nearly so. The flight of Skippers is brisk and devoid of grace; it is rather more like the blundering flight of a full-bodied moth than the business-like progress made by a butterfly.

Obs.—Some entomologists prefer dividing this little group of butterflies into several genera or minor groups; but not being aware of the advantage of this subdivision, I have followed Herrich-Schæffer in keeping them together and calling them all *Hesperia*. It may, however, be observed that *Paniscus*, constituting the genus *Carterocephalus*, as well as *Sylvanus* and *Comma*—which, like so many exotic species, possess uncinate or hooked antennæ—offer noteworthy characters. The British species might, therefore, be divided without impropriety.

60. GRIZZLED SKIPPER.—The antennæ are slender at the base and gradually thickened to the tip, which is bent but not hooked; they are of a smoky black colour, annulated with



60. Grizzled Skipper (*Hesperia Malvæ*).

white : the outline of the wings is very simple : they are of a smoky black colour ; the fore wings are adorned with variously-shaped white spots, the position of which will be seen in the figure ; the hind wings have a compound white spot near the middle, and a transverse series of small white spots parallel with the hind margin : the fringe is spotted with black and white.



Scarce Grizzled Skipper (*Hesperia Lavateræ*).

Varieties.—There is a rather striking variety in which many of the spots on the wings are confluent, and are thus rendered much more conspicuous. Haworth has described this as the Scarce Grizzled Skipper (*Hesperia Lavateræ*). Intermediate specimens between this variety and the type are continually occurring.

Life History.—The egg is laid on the common bramble (*Rubus fruticosus*), and according to Hubner also on the raspberry (*Rubus idæus*). At page 149 of the second volume of the "Entomologist," Mr. Pristo informs us that in May, 1863, he found a pair *in cop.*, and put them in confinement ; the female afterwards laid on the upper side of a bramble leaf, and also on the stems of the bramble, a number of small round eggs of a pale green colour, each egg being deposited singly. The caterpillar is represented by Hubner as drawing together the edges of the bramble leaf from the opposite sides, and thus forming a very exposed dwelling-place : the head is almost round, and wider than the second segment ; it emits a number of short but very strong bristles, which give it a scabrous or rough appearance : the body is cylindrical, but tapers slightly towards both extremities ; like the head it is beset with hairs. The colour of the head is black, of the body either brown or green, having a rather narrow medio-dorsal stripe darker than the ground colour ; besides this there is a triple side-stripe, the median portion of which is of the same tint as the medio-dorsal stripe, but the lateral portions are white. The chrysalis is rather long, smooth, and without angles or projections, but the last segment terminates in a straight horn directed backwards, and furnished with hooks at the top ; the colour of the chrysalis is dull white spotted with black ; the spots are arranged on the back in three longitudinal series, of which the medio-dorsal contains the largest and most conspicuous spots.

Time of Appearance.—May : it remains only a short time on the wing.

Localities.—Unknown in Ireland and the Isle of Man. It occurs in Scotland, but according to Dr. White not in Perthshire. In England I have found it in every locality I have visited.



61. Dingy Skipper (*Hesperia Tages*).

61. Dingy Skipper.—The antennæ are slender at the base, and are gradually thickened towards the tip, which is bent but not hooked ; they are of a smoky-brown colour, delicately annulated with white : the outline of the wings is simple ; their colour is dingy smoky-brown ; the fore wings have an obliquely transverse gray band across the middle, between two darker ones ; there is also a white spot on the costal margin at the commencement of the exterior dark band, and a series of seven or eight white spots on the hind margin, just within the fringe : the hind wings have several pale but obscure spots on the disk, and a series of small white spots on the margin ; the fringe of all the wings is

smoky-brown, with a pale interval opposite each white spot in the hind margin.

LIFE HISTORY.—The EGGS are laid in May on the bird's-foot trefoil (*Lotus corniculatus*); the CATERPILLAR is figured by Hubner as of a pale green colour, and as having on the side two yellow stripes, each of which is surmounted with a series of black spots; the lower series appear to represent spiracles. The CHRYSALIS is smooth, without angles, the thoracic segments being swollen and of a dark green colour; the body is tinged with rosy red; it is conical and pointed.

TIME OF APPEARANCE.—May: it is particularly plentiful in flowery chalk banks in Kent, Surrey, and Sussex.

LOCALITIES.—Mr. Birchall mentions it as having been noticed in Galway, but it has not been recorded from the Isle of Man. Dr. Buchanan White reports it from Kirkcudbrightshire, Inverness-shire, and Ross-shire, but he does not mention it as inhabiting Perthshire. In England it occurs in every county list I have received.



62. Chequered Skipper (*Hesperia Paniscus*).

62. CHEQUERED SKIPPER.—The antennæ are very slender at the base, and gradually but decidedly clubbed at the tip, which is not hooked; they are bright fulvous yellow beneath, and annulated with black and yellow above; the club is brilliantly yellow beneath: the costal margin of the fore wings is very straight and the tip pointed, but not acutely: the colour of all the wings is dark brown; the fore wings have about ten large and conspicuous yellow spots on the disk, besides a series of eight roundish and indistinct yellow spots parallel with the hind margin: the hind wings have three conspicuous yellow spots about the middle, forming something of a triangle, as well as a series of seven yellow spots parallel with the hind margin: the fringe is brown.

LIFE HISTORY.—Duponchel describes the CATERPILLAR as brown with two yellow stripes down the back; the head is black, and the second segment bordered with yellow. It feeds on the broad-leaved plantain (*Plantago major*).

TIME OF APPEARANCE.—June.

LOCALITIES.—I find no record of this little butterfly as an inhabitant of Ireland, Scotland, or the Isle of Man. In England it seems confined to a very few midland counties and one southern county.

Hampshire. Mr. Baker mentions this in Wise's "New Forest." I have not seen a specimen—*C. G. B. Corbin;* Southwick—*Henry Moncreaff;* I have this year taken *Hesperia Paniscus* at Netley Abbey, near Southampton—*Robert Harvey*, "*Intelligencer.*"

Huntingdonshire. Monk's Wood and other woods—*F. Bond;* Monk's Wood in profusion—*Henry Doubleday*, "*Entomolgist,*" Vol. i., p. 156.

Lincolnshire. Bourne—*Stainton's* "*Manual.*"

Northamptonshire. Castor Hanglands, near Peterborough—*F. Bond;* near Towcester—*Hamlet Clarke;* in profusion in a wood near Oundle—*H. Doubleday;* not uncommon in the county; Barnwell and Ashton Wolds in May—*William Bree;* I have taken this insect very freely in the neighbourhood of Kettering—*W. Sturgess*, "*Intelligencer.*"

Nottinghamshire. It occurs in a wood near Newark; also in Ropsley Wood, near Grantham—*R. E. Brameld;* Stapleford, and near Newark, rare—*George Gascoyne.*

Oxfordshire. Wychwood Forest—*W. H. Draper.*

Suffolk. Stowmarket—*Stainton's* "*Manual.*"

63. LARGE SKIPPER.—The antennæ are clubbed and hooked at the tip: the shaft is brown; the club brownish above and fulvous beneath: in the male, the basal half of the fore wings is fulvous, the outer half fulvous brown; but in the middle of the fulvous part is a raised and incrassated black line, which begins near the middle of the wing and ends near the hind margin; near the tip of the wing are six fulvous spots,

three of them near the costal margin, touching each other, or rather separated only by the darker wing-rays; all the wing-rays are dark brown: the hind wings are fulvous brown, with dark brown hind margins, dark brown rays, and about six not very distinct squarish



63. Large Skipper (*Hesperia Sylvanus*). Male and Female.

fulvous spots: all the wings have a fulvous gray fringe. The female has all the wings fulvous brown, with paler fulvous spots; all the hind margins are darker brown, and the fringes fulvous gray.

LIFE HISTORY. — Mr. Stainton, in his "Manual," quoting Professor Zeller, whose accuracy in observation is almost unequalled, says that the CATERPILLAR has a brown head and a dull green body, with a darker dorsal line, dotted with black; beneath, on the tenth and eleventh segments, are snow-white transverse spots. It feeds on the meadow soft grass (*Holcus lanatus*), and on other grasses, in the beginning of May. I believe that I have several times found this caterpillar, and that it has a remarkably large brown head.

TIME OF APPEARANCE.—May and August.

LOCALITIES.—Mr. Birchall gives the Murrough of Kildare as a locality for this butterfly, but no additional information as to its distribution in Ireland; Mr. Alfred Owen has taken it in the Isle of Man, and Dr. Buchanan White says it is indigenous to Scotland. The name occurs in every English county list I have received, except that from Northumberland; in those from southern counties the name is generally accompanied by some expression indicative of its abundance.



64. Silver-spotted Skipper (*Hesperia Comma*). Male and Female.

64. SILVER-SPOTTED SKIPPER.—The antennæ are clubbed and hooked at the tip. The upper side of the shaft is brown, the under side fulvous; the upper side of the club is black, the under side bright fulvous. In the male, the basal portion of the fore wings, extending two-thirds the length of the wing, is bright fulvous, and the outer, or hind marginal third, dark brown; in the middle of the fulvous portion is a raised and incrassated slightly oblique black line, which commences near the middle of the wing and trends towards the base of the inner margin: in the brown or hind-marginal portion of the wing and above the middle, are six pale yellowish spots; three of these, near the costal margin, are linear, crowded together, and only separated by the darker wing-rays: the hind wings are dark brown round the margin, paler in the middle, and having the paler portion spotted with fulvous. The female is more dingy than the male, the spots are less distinct, and the black line is altogether wanting. The under side of the fore wings is yellow towards the body and greenish towards the tip; at the very base are three broad dashes of black: the hind wings have a number of squarish spots of a silvery whiteness, whence the name of "Silver-spotted Skipper."

LIFE HISTORY.—The CATERPILLAR feeds on the common bird's-foot (*Ornithopus perpusillus*)

bird's-foot trefoil (*Lotus corniculatus*), and other leguminous plants. It has a large black head and a cylindrical olive-green body, with a linear white spot on each side of the tenth and eleventh segments, very near the ventral surface.—*Hubner's figure.*

Time of Appearance.—July and August.

Localities.—Unknown in Ireland, the Isle of Man, or Scotland. It is by no means generally distributed in England, but is common in some localities, more particularly in chalk districts of the south and east.

Berkshire. Burghfield, near Reading—*C. S. Bird.*

Buckinghamshire. Aston Clinton—*H. H. Crewe;* Halton—*Joseph Greene.*

Cambridgeshire. Newmarket Heath—*F. Bond;* common in the chalk districts about Fulbourn and Newmarket—*Thomas Brown.*

Devonshire. Rare; I took one specimen in 1856 near Wimbury, along the embankment road; Plymouth, Exmouth—*J. J. Reading.*

Dorsetshire. Blandford Racecourse and Badbury Rings—*J. C. Dale.*

Gloucestershire. Rodborough Common, one specimen—*J. M. Musgrave.*

Hampshire. Portsdown—*W. Buckler;* Kimpton—*Rev. J. T. Rudd;* Petersfield—*Henry Moncreaff;* Lyndhurst, in New Forest—*H. Ramsay Cox.*

Hertfordshire. Berkhampstead Common, one specimen—*G. H. Raynor.*

Kent. Boxley Hills, near Maidstone; not very common—*H. W. Greensted;* on the coast about Dover—*W. O. Hammond.*

Northamptonshire. Rare; in a rough field adjoining Bullnose Coppice, in August—*William Bree.*

Surrey. Croydon and Boxhill—*W. Machin;* on all the chalk downs in the Croydon district—*E. Newman.*

Sussex. Common on Malling Hill—*Edward Jenner;* Hollingbury Coombe—*W. Buckler;* very plentiful on the chalk, Bible Bottom; Cliff Hill is a favourite locality—*C. V. C. Levitt;* Brighton—*W. H. Draper.*

Wiltshire. One specimen near Martinsell, in 1865—*T. A. Preston.*

Yorkshire. Scarborough, York—*Edwin Birchall.*



65 Lulworth Skipper (*Hesperia Actæon*). Male and Female.

65. Lulworth Skipper.—The antennæ are slender at the base, and gradually clubbed but not hooked at the tip; they are brown above and gray beneath, slightly dotted or annulated with brown, the extremity of the club beneath being bright fulvous: the wings are dusky fulvous, with a narrow brown margin and a pale fringe: the male has an oblique and slightly raised but slender intensely black line, extending from the middle of the wing nearly to the inner margin at its base; and the female has nine rather pale fulvous spots near the middle of the fore wings, and arranged somewhat in the form of a crescent; this quasi-crescent opens towards the costal margin.

Life History.—At page 164 of the tenth volume of the "Intelligencer," Professor Zeller gives the following interesting particulars of this species:—"The caterpillar feeds in June on the wood small-reed (*Calamogrestis epigejos*), chiefly under the shade of fir-trees; it makes deep notches on the edges of the leaves, which help to betray its proximity. It feeds in the evening and at night, resting in the daytime extended on the flat surface of a leaf. It is of the form usual in the genus, and it has also two snowy spots, as in the caterpillars of *Lineola* and *Sylvanus*. It is pale green, with a darker dorsal line edged with a yellowish line on each side; and enclosing a paler central line. Along the side is a narrow yellow line above and a broad one beneath; the two yellow lines on the back

are prolonged as far as the middle of the green head, and run to the end of the rounded anal shield, which is narrowly edged with yellow. Towards the end of June the caterpillar spins together two leaves with a few white silk threads, and becomes a slender agile CHRYSALIS, the peculiarities of which I had, however, no opportunity of observing. In a fortnight two males made their appearance."

TIME OF APPEARANCE.—July and August.

LOCALITIES.—Its range in the British Isles is more restricted than that of any other of our butterflies. It has never been observed in Ireland, Scotland, or the Isle of Man. In England it has only been recorded from three counties. We are indebted to the indefatigable Mr. Dale for the discovery of this insect at Lulworth Cove in August, 1832, as announced by Mr. Curtis in his "British Entomology," Fasc. 442. I believe it to be extremely local—that is, frequenting particular spots, but still abundant in those spots, scattered at intervals all along the sea-coasts of Devon and Dorset. In an extract given below Mr. Douglas treats of Lulworth Cove and the Burning Cliff as synonymous; but all my correspondents write of them as two localities. The Warwickshire localities, although confidently spoken of, are very unlooked for, and are, I think, fairly open to doubt.

Devonshire. Extremely local, frequenting cliffs and coves on the coasts, more especially cliffs east of Sidmouth and Torquay—*J. J. Reading;* Mr. Hellins has also taken it near Sidmouth.

Dorsetshire. Lulworth and Burning Cliff by Holworth—*J. C. Dale.* An hour's sail across Weymouth Bay, during which we amused ourselves with catching mackerel, brought us to the desired spot, the Burning Cliff (or Lulworth Cove), where we had been told we should find *Hesperia Actæon*, and there, sure enough, we saw it in profusion. The spot, close to the sea, is a kind of undercliff, not very level, of no great extent, and covered with thistles and large tufts of a long coarse grass or *Carex*, about which our prey were skipping briskly. So abundant were they that I often had five or six in my net at one stroke, and in about two hours I caught a hundred, filling my box and my hat, and Mr. Farr had nearly as many. They were accompanied by a few of the common *Hesperia Linea*, which in their flight they greatly resembled. My ungeological eyes detected nothing particular in the soil, and I confess that two hours' hard work in the sun had not disposed me to look if any particular plant which might serve as food for the caterpillars of this Skipper grew there; so that I can offer no supposition as to the cause of the species being confined within such narrow limits in this county—*J. W. Douglas, Stainton's "Manual."* *Hesperia Actæon* has been taken this year (1870) in two new localities in this neighbourhood, at Swanage and near Tyneham — *T. Parmiter*, "*Entomologist*," v. 179.

Warwickshire. Stratford-on-Avon—*W. G. Colbourne;* Mr. Humphreys states that he met with it in great abundance in 1835 at Shenstone, near Lichfield — *Stainton's "Manual."*



66. Small Skipper (*Hesperia Linea*). Male and Female.

66. SMALL SKIPPER.—The antennæ have a gradually thickened club, which is not hooked at the tip; they are brown, annulated with gray, and having a distinct fulvous tip. In both sexes all the wings are fulvous, with a black hind margin and wing-rays and a pale fringe: in the males there is a slender oblique black line extending from near the middle towards the base of the hind margin, which, however, it does not reach.

LIFE HISTORY.—The EGG is laid on various grasses in July, and the young CATERPILLAR probably hybernates when small; it has been found full grown and feeding on grass in the following June, when it is somewhat shuttle-shaped, gradually tapering, especially towards the posterior extremity; the head is of the same width as the second segment; the head and body are green, the latter having six slender white stripes: it spins a silken cocoon among the blades of grass, and therein turns to a green CHRYSALIS, which has a pointed head-case, and is very sharply tapered towards the tail. It remains but a short time in the chrysalis state.

TIME OF APPEARANCE.—July.

LOCALITIES.—Mr. Birchall took *Hesperia Linea* in Ireland at Powerscourt and near Cork, but did not observe it in the Isle of Man; and I have no record of its having been taken in Scotland. In England it is generally abundant, more particularly in the southern and midland counties, but has mysteriously disappeared from many places where it was formerly common; in Essex it occurs in open swampy places that are covered with rushes.

ERRATA.

Page 138, *line* 22, *for* May *read* July.

„ „ „ 17, *from the bottom, for* final *read* first.

Page 158.—By an inadvertence the figure of the female *Daplidice* is placed above the male, contrary to the arrangement of the sexes I have adopted in other instances.



Doritis Apollo, frequently mentioned as British, but of which I know of no British specimen (*See next page.*)

ADDENDUM.

The following notes respecting *Doritis Apollo* will be read with interest, but I cannot say that I consider them to warrant my placing this species in the British list.

I have recently heard that the *Papilio Apollo* of Linnæus has been found in Scotland, but I have not seen a British specimen—*Haworth*, "*Lepidoptera Britannica*," preface xxix. See also Haworth in "*Entomological Transactions*," vol. i., p. 232, and Donovan's "*British Insects*," vol. xiii., p. 433.

I was informed by the late Sir William Hooker that in 1812, or about that date, *Apollo* is said to have occurred in the Island of Lewis, and was taken by a tenant of Lord Seaforth's, who had the specimen, but that there being at that time some communication between Norway and the Island of Lewis, the specimen might have come from Norway—*J. C. Dale.*

The late Mr. Haworth informed me that a lady, whom Mr. Curtis believed was the Marchioness of Bute, told him she had received a specimen from some alpine place on the West Coast in the North of Scotland—*J. C. Dale.*

Mr. Curtis was convinced he saw a specimen of *Apollo* flying over the top of a house at the foot of Ben Lawers; and afterwards, on seeing this species on the Continent, he felt assured he was correct—*J. C. Dale.*

Mr. Wailes, of Newcastle, told me he had a correspondent in Lewis or Harris, from whom he had received many insects, especially *Carabus arvensis* and *C. clathratus*, who knew *Apollo* well, and said he had taken it; and he particularly described the red *ocelli*—*J. C. Dale.*

Mr. Floyer, M.P., told me he had seen a specimen of *Apollo* in Sir C. Trevellyan's cabinet—*J. C. Dale.*

Sir C. Lemon wrote to me that he had taken a specimen of *Apollo* in Cornwall, but suggested that it might have been imported with plants in his hothouse—*J. C. Dale.*

Obs.—Mr. Dale, who has so repeatedly assisted me during the progress of this work through the press, kindly sends me the preceding information, in accordance with my own request.

As you wish for more particulars about the capture of *Apollo*, I have been to-day to see the person who took it, and hear from his own lips all about it. He was lying on the cliffs at Dover, in the end of August or the beginning of September, 1847 or 1848 (he cannot remember which), when the butterfly settled close to him, and not having his nets, he captured it by putting his hat over it. He then carried it to his lodgings, shut the window and door, and let it go in the room and secured it. He had not the slightest idea what it was till he saw it figured in some work afterwards. The insect has all the appearance of having been taken as he describes; and as he has no object to deceive, and is a person in whom I can place implicit confidence, I have no doubt, in my own mind, that the specimen is a British one. It will probably be in my own collection before this letter reaches you, when I shall be most happy to show it to you at any time you are this way—*G. B. Wollaston*, "*Zoologist*" for 1856, p. 5001.

I beg to inform you that I yesterday met a gentleman who assured me that he saw *Apollo* at Hanwell about six years ago. He chased it, but without success. This gentleman's veracity may be relied on. At a time when *Apollo's* claim to be a British insect is under discussion, every scrap of information is of value—*Henry Austin*, in the "*Zoologist*" for 1856, p. 5109.

AN

ILLUSTRATED NATURAL HISTORY

OF

BRITISH MOTHS.

BY

EDWARD NEWMAN, F.L.S. F.Z.S.

THE FIGURES
DRAWN BY GEORGE WILLIS,
AND
ENGRAVED BY JOHN KIRCHNER.



THE DOG'S-TOOTH *(Hadena suasa)*.

London:
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PREFACE.

It has for very many years been a favourite project of my own to publish a History of British Butterflies and Moths, illustrated with woodcuts of each species, uniformly with Van Voorst's series of Birds, Reptiles, Fishes, Starfishes, Stalk-eyed Crustacea, and Ferns. The success of these works in a mercantile point of view has been beyond question; and this fact involves another and more important conclusion, that an extensive public has found them both serviceable and agreeable. Seeing this, and believing I could furnish materials for a similar work on our native Lepidoptera, I determined on such an undertaking as soon as those materials were complete.

When I commenced the work it was intended to include the Deltoids, Pyrales, Veneers, and Plumes; and thus, with my own "*British Butterflies*," Mr. Wilkinson's "*Tortrices*," and Mr. Stainton's "*Tineæ*," to form a descriptive list of all the British *Lepidoptera:* but it was found impossible to make effective representations in wood, of insects so minute as the majority of those contained in the four families I have mentioned; and extremely difficult to fix any scale by which to represent them of a uniformly increased size: the difficulty, indeed, seemed so great that the project has been abandoned for the present.

It is, however, still under consideration to publish an illustrated Natural History of the British Butterflies uniformly with this of the British Moths, representing each species exactly life-size, and giving studiously accurate figures of a great number of varieties: for this rather extensive work the text is already in a forward state; but many months will of necessity be occupied in drawing and engraving the illustrations; so that a year, at least, will elapse before this intended work can be completed in such a manner as shall do credit to the artists as well as to the author: as soon as any plan for this second undertaking is definitely settled, full particulars will be advertised through the usual channels.

Both these projects—the Moths accomplished, and the Butterflies in preparation—are, so far as my information extends, entirely original and unique; and we are all aware that the carrying out of any new project must of necessity be somewhat imperfect. The originality and isolation of the undertaking appear in my determination to write all my descriptions both of the perfect insect and of the caterpillar from the objects themselves, and not to compile them from previously published sources. In this I have in great measure, but not wholly, succeeded: a few caterpillars have still eluded my most anxious search; and I have therefore adopted, and always with the fullest acknowledgment, previously published descriptions. This desire for originality certainly influenced my great predecessor Haworth, and he succeeded to admiration in carrying it out so far as the perfect insects are concerned, although he clothed his descriptions in a language that has greatly restricted their utility. But I think he has not described a single caterpillar; even in the case of the Death's-Head Hawk-

Moth, which he not only possessed but admired, he has preferred quoting the familiar Latin description written by Fabricius. Even of such copied descriptions we find very few throughout his great work: in the majority of instances he makes no more allusion to the caterpillar and chrysalis than as if they had no existence. It may seem presumptuous in me to pen anything approaching to a criticism on so great a master of the science as Haworth unquestionably was; but although the feeling of courtesy and deference to so high an authority might suggest the propriety of suppressing all allusion to the omission, still the omission itself would remain; and it would be evident that, while Sepp, Hübner, and other continental entomologists were describing or figuring the caterpillars of British *Lepidoptera* with the most painstaking accuracy, Haworth contented himself with saying that while his "descriptions of every species and variety of the perfect insect were entirely new wrought and from British specimens, his descriptions of *larvæ* and *pupæ* have been principally taken from the '*Entomologia Systematica*' of Fabricius, because his own notes on those two points were not so full as he could wish, and were chiefly made before he had conceived an idea of submitting them to the inspection of the public eye." It thus appears that the idea of publishing original descriptions of caterpillars and chrysalids had been entertained by Mr. Haworth, but was advisedly abandoned: also that he had made notes of the preparatory states of the *Lepidoptera*, but never published them.

Subsequent British authors have adopted a very similar course, but have taken some pains to import European figures and European descriptions into their works. Curtis and Humphreys have given excellent copies of continental originals, and Mr. Stainton has extracted brief notices of caterpillars from the works of Sepp, Hübner, Boisduval, Duponchel, Freyer, Guenée, and others; but the difficulty of associating the perfect insects with the caterpillars which produced them, has been found insuperable from the extraordinary discrepancy formerly existing between our own insular, and the accepted continental specific names. A familiar illustration of this occurs in the instance of *Limenitis Sibylla*. Every English entomologist has accompanied the perfect butterfly with the caterpillar of another species, simply from this discrepancy of names: I could point out hundreds of similar instances, but I am treading on very tender ground, and will forbear.

Still, although I will give no recent examples of this extraordinary and apathetic negligence, I may cite the opinion of an entomologist with whom I had never exchanged a sentiment, but who by his own observations had arrived at conclusions exactly similar to my own. He writes thus:—

"Now that entomologists are becoming more numerous in England each year, and consequently the literature having the study of insects for its object is in proportionate demand, it is, I think, a matter to be deplored that books intended for instruction in, and introduction to, the study of Entomology should be most conspicuously open to the charge of carelessness, either in the writing or revision; or, where this fault cannot fairly be charged, a worse may be urged, namely, that the descriptions of the caterpillars—I am speaking now more particularly of the *Lepi-*

doptera—should not be original, but borrowed from foreign writers, many of whom (if the caterpillars they describe are identical with those for which the several descriptions are used by the English writers), I am afraid, allowed their vivid imaginations to supply the place of sober fact."—*A. B. Farn in the "Entomologist" for April*, 1869.

Now this is the exact truth expressed in the mildest and most inoffensive form. The writer goes on to adduce the necessary proofs of his assertions, but I will not repeat them, because the assertions themselves cannot be called in question, and need no corroboration. I have long since entertained the same views, and have long since seen the necessity for reform.

Ten years ago I commenced, in the monthly numbers of the *Zoologist*, the task of describing our English caterpillars from nature; and in the same year the Rev. H. Harpur Crewe commenced his descriptions of those of the genus *Eupithecia*. In both cases isolated descriptions appeared as we could find or procure the objects. This proceeding found little favour in the eyes of our brethren; but I have persevered, and, through the kind assistance of a few friends, have been enabled to produce minute descriptions of most of our English caterpillars from the objects themselves, without any reference to prior definitions, most of which I found so vague, and named in so different a manner from our own, that it was impossible to utilize them. All my own descriptions, and, by his express permission, those by Mr. Crewe, are now transferred to these pages, as well as a few others, written also from the objects themselves, by the Rev. John Hellins, of Exeter, and Mr. Buckler, of Emsworth, gentlemen to whose industry we are all greatly indebted for much valuable information in this department of Natural History.

And here, at the risk of exposing myself to the charge of irrelevant digression, I cannot forbear to notice Mr. Stainton's beautiful and most useful "Natural History of the Tineina." This invaluable work, commenced in 1855 and continued almost up to the present time, really leaves nothing to be desired, and acts as a severe reproach on the student of the larger species, the life history of which may be studied with so much greater facility.

The classification of *Lepidoptera* has always been unsatisfactory: as in *Hymenoptera* and *Diptera* the most ready and obvious character for making a first division into two groups, is the difference in which the union of the thoracical and abdominal segments is accomplished. An insect is composed of thirteen segments, or rings, one of which is the head, four constitute the chest (in science *thorax*), and nine the body (in science *abdomen*). In a very great number of insects the first segment or ring of the abdomen is slender, forming a petiole or peduncle, which gives the insect the appearance of being almost cut in two; a mere thread being left, which connects the two halves together: a wasp exhibits this structure in perfection. In other insects the thorax and body are continuous, as represented in all the figures in this work. In *Lepidoptera* these two characters are very obvious. Butterflies (in science *Lepidoptera pedunculata*) have the thorax and abdomen connected by a mere peduncle: Moths (in science *Lepidoptera sessiliventres*) have no obvious division into thorax and abdomen,

these parts forming a continuous trunk. The *Hymenoptera sessiliventres* are the saw-flies, the *Hymenoptera pedunculata* are all the rest. The *Diptera sessiliventres* are the crane-flies and gnats; the *Diptera pedunculata* are all the rest.

Those who have made entomology their study will know that these divisions are unequal, in each instance one group being much more comprehensive than the other. This is the case in British *Lepidoptera*, in which the Sessile-bodied *Lepidoptera*, or Moths, outnumber the Pedunculated *Lepidoptera*, or Butterflies, as thirty to one: indeed, the number of moths inhabiting Britain has been ascertained to be more than eighteen hundred and fifty, and, when collectors have the assistance of popular works, it may reasonably be expected to reach two thousand; for it is most evident that nothing promotes the discovery of new objects so effectually as a reliable and faithful guide to a knowledge of those which have been already ascertained.

These two thousand moths were arranged by the illustrious Linnæus under two heads, *Sphinx* and *Phalæna*; and the equally illustrious Latreille adopted these divisions, merely altering the names, and calling the former *Crepuscularia* and the latter *Nocturna*. Boisduval subsequently united these two groups under the name of *Heterocera*, implying the diversity of form in their antennæ, and at the same time gave the name of Club-horned (in science *Rhopalocera*) to the Butterflies. There is, however, no real or natural distinction to be found between *Sphinges* and *Phalænæ*, and therefore entomologists are now agreed in entirely abandoning groups which they cannot distinguish much less define, the only difference being in the name; the terms *Nocturna*, *Heterocera*, *Sessiliventres*, and Moths, being always applied to the same group of insects, and all these terms including both the Linnean genera, *Sphinx* and *Phalæna*.

The divison of the larger moths is still very incomplete, and must be considered as requiring improvement. The great groups now stand as Nocturnes, Geometers, Cuspidates, and Noctuas: three of these groups appear to be well defined and natural; the first, Nocturnes, is heterogeneous and far too comprehensive. So far back as the year 1832 I ventured to propose a further subdivision of the Nocturnes, the merits of which division, if merits there be, were entirely forestalled by Messrs. Denis and Schiffermüller, two Austrian officers who, in 1776, published an anonymous work on the *Lepidoptera* found in the neighbourhood of Vienna, and who employed the differences of the caterpillar in subdividing this difficult group, adopting as their motto, "One eye to the caterpillar and another to the perfect insect." Their divisions are, however, mainly dependant on the caterpillar and are strictly natural.

Notwithstanding these and other improvements made from time to time, as our knowledge of the preparatory states has progressed, no entomologist competent to form an opinion will venture to say that we have arrived at anything approaching perfection in our arrangements. Although a century has been spent in our search after truth in this matter, we are still nothing more than students, and when we attempt to teach, as in the present instance, we are, alas! too apt to say what must be again unsaid, too apt to write what must be again unwritten. Let us work and hope.

An imperative but most agreeable duty remains—that of thanking those kind friends who have rendered me such important services during the progress of this work. And first Mr. Doubleday, through whose hands every sheet and every column has passed. Many omissions have thus been supplied and many errors expunged. An almost perfect blank has hitherto existed as to the times of appearance of our *Lepidoptera* in the perfect state, and my own experience was insufficient to supply this blank. Although for many years I was an assiduous collector of insects, I never gave that especial attention to *Lepidoptera* which they have received at the hands of my friend. The collections of *Diptera*, *Hymenoptera*, *Coleoptera*, and *Neuroptera* under my care, attest the fact that my attention has been equally divided amongst all classes of insects, and it is next to impossible to acquire anything approaching a perfect knowledge of the times of appearance of every species. Mr. Doubleday has abundantly made up for my shortcomings in this respect, and has supplied me with information which, in many instances, has never before appeared in print. Then again the *Eupitheciæ*, and the *Leucanidæ* have undergone a complete revision at his hands; he has found it necessary to alter a few names, generic as well as specific, and to institute a few new combinations.

The idea that at any given period we can assert that we have reached the ultimatum of knowledge appears to me utterly untenable; and I feel assured that the assiduity of future labourers in this delightful field, will lead to the addition of many facts I have omitted, and the emendation of many errors I have allowed to pass. Were it not so—were there no *Excelsior*—the study would lose one of its principal charms. The slight inconvenience caused by altering a name, or amending a description, is abundantly compensated by the advantage of substituting truth for error. In expressing these opinions to a very candid friend, he at once enquired, "How do we know that even these amendments are final? What security have we that amendments themselves will not require emendation?" I answered, "There is certainly no such security; and I desire none: I have no more power to affix limits to knowledge than to arrest the growth of an oak; and I regard with no feelings of apprehension the advent of some future Doubleday who may detect errors in the labours of him who is happily still amongst us."

To Mr. Bond my especial thanks are also due: with a liberality equal to Mr. Doubleday's he has placed the free use of his immense collection at my disposal; he has repeatedly invited me to select specimens, even when unique, for the purpose of figuring; and by this means I have been enabled to give accurate representations which it would have been otherwise quite impossible to obtain.

To Mr. Birchall I am indebted for the loan of some of his choicest specimens; and for the expression of his opinions on questions of great interest and importance; more particularly in the genus *Dianthœcia*, with which, in a state of Nature, he has a more practical acquaintance than any other British entomologist: the distance of his fine collection from London has been the only bar to my availing myself far more

largely of its treasures, for Mr. Birchall has evinced throughout the work a desire to afford the most cordial co-operation.

Mr. Wellman, Mr. Fenn, Mr. Vaughan, Mr. Machin, and others have most kindly lent me specimens to figure when requested; and I believe I have in no instance omitted to acknowledge in its proper place the assistance I have thus received: should any such omission be discovered, I trust that it will be forgiven, for it can have no other cause than mere inadvertence.

To Mr. Thomas Huckett, formerly an assistant in my office, I was indebted for an unceasing supply of those caterpillars which I described month after month in the pages of the *Zoologist*. I cannot overstate the value of his zeal and energy; they were only equalled by his intimate knowledge of the species he procured.

From Mr. Wright also I have often received the same kind of help in this investigation of caterpillars; and I may truly say I have never met with an entomologist who managed them with greater skill or more unquestionable success.

To M. Guenée's volumes on Geometers and Noctuas I am under the greatest obligation; without free access to these fountains of Moth lore, my labours would have been very imperfect.

In conclusion, let me remind my younger friends and fellow-students in this interesting science, that individual exertion will never suffice for the formation of even a moderately good collection. Let them assiduously help one another: let them offer their duplicates and make known their wants through the *Entomologist*, which is published by Messrs. Simpkin, Marshall, & Co. for this especial purpose; but let them avoid bargain-making. If an entomologist gives liberally he will be sure to meet with a liberal return.

And now, after a most agreeable companionship of so many months, I must take leave of my subscribers, trusting to meet them hereafter in the monthly issues of the *British Butterflies*. Until then, I wish them every happiness and every success in a pursuit which, unlike many of our human avocations, has no alloy.

EDWARD NEWMAN.

York Grove, Peckham.
1 *June*, 1869

THE

ILLUSTRATED NATURAL HISTORY

OF

BRITISH MOTHS.

BY

EDWARD NEWMAN, F.L.S., F.Z.S., &c

NOCTURNI.

THE SPHINGIDÆ.

1. The Eyed Hawk-Moth (*Smerinthus ocellatus*).
2. The Poplar Hawk-Moth (*Smerinthus Populi*).
3. The Lime Hawk-Moth (*Smerinthus Tiliæ*).
4. The Death's-Head Hawk-Moth (*Acherontia Atropos*).
5. The Convolvulus Hawk-Moth (*Sphinx Convolvuli*).
6. The Privet Hawk-Moth (*Sphinx Ligustri*).
7. The Spurge Hawk-Moth (*Deilephila Euphorbiæ*).
8. The Bedstraw Hawk-Moth (*Deilephila Galii*).
9. The Striped Hawk-moth (*Deilephila livornica*).
10. The Silver-striped Hawk-Moth (*Chærocampa Celerio*).
11. The Small Elephant Hawk-Moth (*Chærocampa Porcellus*).
12. The Elephant Hawk-Moth (*Chærocampa Elpenor*).
13. The Oleander Hawk-Moth (*Chærocampa Nerii*).
14. The Humming-Bird Hawk-Moth (*Macroglossa stellatarum*).
15. The Broad-Bordered Bee Hawk-Moth (*Macroglossa fuciformis*).
16. The Narrow-Bordered Bee Hawk-Moth (*Macroglossa bombyliformis*).

THE Moths may be known from Butterflies by four characters that are very simple and easy to understand. In the first place, they fly by night instead of by day; in the second place, their bodies are not nipped in at the middle or waist, like those of butterflies; in the third place, their feelers, or *antennæ*, have no knobs at the end like those of butterflies; and, in the fourth and last place, when a moth is at rest, its wings are either laid on its body or folded round its sides, whilst those of a butterfly stand up straight, quite upright, and back to back.

Having thus a method by which we can distinguish a Moth from a Butterfly, we must try to find how to make divisions among the Moths; for there are about nineteen hundred Moths in Great Britain and Ireland, and unless we can divide this large assemblage into sections, we shall have a great difficulty in making our descriptions intelligible.

The first family are called Hawk-Moths, or Humming-bird Moths (from their mode of flight), and in Latin *Sphingidæ*, derived from a fancied resemblance of the caterpillars which produce these Moths, to the celebrated Egyptian Sphinx, a fictitious animal, of which pretended images were carved out of granite three thousand years ago. The Hawk-Moths are all large insects, with thick bodies, rather pointed at the tail, and with rather narrow, but very strong wings; they fly with great velocity. Many of them have a very long honey-sucking tube, which they stretch out in a straight line before their heads, and inserting it into the cups of flowers, they suck out the honey while hovering in the air. Mr. Douglas has written the following beautiful description of the flight of a Sphinx:—"Did you ever see a Sphinx fly? While you are looking at a flower, in the twilight, between you and it glides a motion, a moving haziness, which is before you, and yet conveys to your eyes no definite image. Before you have half thought what it can be, you see the flower again distinctly, and rub your eyes, thinking there must have been an illusion, or possibly an unsteadiness of vision caused by the irritation of that gnat which was buzzing about your head, when, lo! the flower just beyond seems to shiver; you move to see what is there, but there is a move before you, and a dim shadow flits away like a thought. Can it be anything real? Stand still awhile: and now, in the increasing gloom, as you bend over the petunias, holding your breath, you see a darkness visible drop down before you: but its presence is better made known by the humming caused by the rapid vibration of its wings. Stir not, or this aërial body will float away. Now, you see it deigns not to alight, or touch the margin of the chalice; but poising itself in the air, stretches out its long tubular tongue, and quaffs the nectar at the bottom."

The caterpillars of all the *Sphingidæ* are large and smooth, they are quite without hairs, and most of them have a hard curved horn just above the tail. We now proceed to describe the Moths in systematic order.



1.—The Eyed Hawk-Moth (*Smerinthus ocellatus*).

1. The Eyed Hawk-Moth, so called from a large and beautiful spot in each of the hind wings that somewhat resembles an eye. The fore wings are brown, with a very beautiful reddish bloom over them, and clouded with olive-brown. The hind wings are of a delicate rosy red at the base, and pale brown towards the margin; and each has a large and beautiful eye-like spot, grey in the centre, surrounded with blue, and the blue surrounded by a black ring. The skin of the caterpillar is rough, like shagreen; it is pale green, sprinkled with white, and has seven oblique white stripes on each side. The horn at the tail is blue. It is very common in the autumn, feeding on apple trees in gardens, and on willow bushes in hedges. The chrysalis is red-brown, and glossy. The Moth is found about Mid. ummer. (Scientific name, *Smerinthus ocellatus*.)



2.—The Poplar Hawk-Moth (*Smerinthus Populi*).

2. The Poplar Hawk-Moth.—The wings are notched at the margin; the fore wings grey-brown marbled with darker brown, and having a white dot in the middle: the hind wings red at the base, brown towards the margin. The caterpillar is rough like shagreen, green sprinkled with yellow; and it has seven oblique yellowish stripes on each side: there is also a row of red dots along each side at the breathing holes. The horn at the tail is yellow, inclining to red beneath. It feeds principally on the common upright Lombardy poplar, but also, in gardens, on the common laurel and laurustinus. The chry-



3.—The Lime Hawk-Moth (*Smerinthus Tiliæ*.)

salis is rough, and always looks as though it had been dipped in mud, and dried without washing. The Moth is common on palings, and on the trunks of poplar trees, about Midsummer. (Scientific name, *Smerinthus Populi.*)

3. The Lime Hawk-Moth.—The fore wings are olive-brown, with a central cross-bar of dark olive-green, and a green border; the cross-bar is often divided in the middle so as to form two spots hind wings brown, with a darker band passing across them; the base of the hind wings is rather darker than the rest; not pink, as in the Eyed Hawk-Moth, or red, as in the Poplar Hawk-Moth. The caterpillar is rough like shagreen, greenish sprinkled with yellow dots, and having seven oblique yellowish stripes on each side; these stripes are sometimes margined with red: the horn at the tail is blue above, and yellow beneath; and beneath the tail is a flat purple plate or scale, with a yellow edge. It feeds on elm trees and lime trees. The chrysalis is of a dull red colour, and rough like the caterpillar. (Scientific name, *Smerinthus Tiliæ.*)



4.—The Death's-Head Hawk-Moth (*Acherontia Atropos*).

4. The Death's-Head Hawk-Moth.—Fore wings rich brown, beautifully mottled and banded, and having a pale dot in the middle. Hind wings yellow, with two black bands. On the thorax is a very conspicuous mark resembling a skull, which has given rise to the name, and also to many superstitions respecting this curious insect. The body is yellow, with six black bands and a row of six large blue spots arranged in a line down the middle of its back.

The caterpillar is smooth, and generally yellow, sprinkled over with minute black dots, and having seven oblique blue stripes on each side, each pair of them meeting together on the back in a point; towards the belly of the caterpillar they become darker and almost black, and are margined by a delicate white line; the horn above the tail is very rough and bent down, but turned up again at the tip. It feeds on the deadly nightshade, the potato, and the tea-tree: the chrysalis is enormously large, of a reddish-brown colour, smooth and shining. The caterpillar is found in August, the perfect insect in October: it is very fond of honey, and creeps into the hives in the South of Europe, and, with its short thick trunk, sucks the honey out of the cells.

This insect is as extraordinary in its habits as in its appearance. In all the stages of its existence, whether as caterpillar, chrysalis, or perfect insect, it has the power of uttering a distinct cry, or sound. The noise made by the caterpillar was first noticed by Fuessly: when disturbed it draws back its head very quickly, making at the same time a loud snapping noise, which has been compared to a

series of electric sparks. Kirby and Spence, the authors of the invaluable "Introduction to Entomology," and all subsequent writers on Entomology, notice this fact; and we have ourselves repeatedly confirmed it during the past summer. We have also observed that the chrysalis squeaks when about to change to a moth; but the sound produced by the perfect insect is the most remarkable. "When it walks, and more particularly when it is confined or taken into the hand, it sends forth a strong and sharp cry, resembling that of a mouse, but more plaintive, and even lamentable, which it continues as long as it is held. This cry does not appear to be produced by the wings, for when they, as well as the thorax and abdomen, are held down, the cries of the insect become still louder." There has been a great diversity of opinion as to the manner in which this squeaky sound is produced. Reaumur occupied himself very assiduously in endeavouring to arrive at a satisfactory conclusion on the subject, and at last decided that it proceeded from the mouth. The insect, in common with all other Moths, has two short feelers, or palpi, in front of its head, and between these is situated the trunk, tongue, or proboscis; and Reaumur thought that it rubbed the trunk against the feelers, and that the squeaking resulted from this friction. He straightened out the curved proboscis with a large pin, and as often as he performed this operation the squeaking ceased, and was renewed again directly he allowed the proboscis to resume its usual position. He then separated the feelers widely, so that they could not touch the proboscis, and this also stopped the sound; he then cut off one of the feelers, and the sound was scarcely audible. Schrœter was also of opinion that the sound was produced by rubbing the proboscis against some part of the head, but he does not specify what part of the head. Huber, Rœsel, and other entomologists totally dissent from this view, and the latter made up his mind that it was caused by rubbing the thorax against the abdomen, or that part of the body that immediately joins the thorax or chest. It is not a little remarkable, that, now the insect has become comparatively common, our excellent living entomologists have not solved this curious problem. However, let the cause of the noise be what it may, the effect is to produce the most superstitious feelings among the uneducated, by whom it is always regarded with feelings of awe and terror. (Scientific name, *Acherontia Atropos.*)



5.—The Convolvulus Hawk-Moth (*Sphinx Convolvuli*).

5. The Convolvulus Hawk-Moth.—Fore wings grey, delicately marbled and mottled with darker waved lines: hind wings paler grey, with three dark, almost black bands, the middle double, body with a grey stripe down the middle, and alternate pink and black spots on each side, a narrow white line between the two colours. The trunk, or tongue,

is remarkably long, quite as long as the body. Caterpillar smooth, generally green, with seven oblique black stripes on each side; each black stripe is bordered with a whitish stripe: the head and the horn above the tail yellowish; sometimes the caterpillar is brown, with the back and oblique stripes much darker: it is said to feed on the bind-weed. The chrysalis is smooth, and the long trunk is projected in front like a great beak. Although the perfect insect is by no means uncommon, we have never seen the caterpillar or chrysalis, and have copied our description from a very useful German work called the "Butterfly Book," by F. Berge. The Moth flies in September. (The scientific name is *Sphinx Convolvuli.*)



6.—The Privet Hawk-Moth (*Sphinx Ligustri*).

6. The Privet Hawk-Moth.—Fore wings brown, clouded lengthwise with darker shades: hind wings pink, with three black bands; body with a broad brown stripe down the back and a black line in the centre; the sides beautifully marked with pink and black alternately. Caterpillar very smooth, delicate green, with seven oblique stripes on each side; that portion of the stripes near to the head is of a delicate purple, and that portion nearest the tail of an equally delicate white; the horn is black at the tip and on the upper side, but yellow at the base beneath: it feeds on lilac, privet, and several other plants. The chrysalis is smooth, and has a beak in front. The perfect insect appears about Midsummer; the caterpillar in August and September. (The scientific name is *Sphinx Ligustri.*)



7.—The Spurge Hawk-Moth (*Deilephila Euphorbiæ*).

7. The Spurge Hawk-Moth.—Fore wings grey, with an almost square olive-brown blotch; at the base another olive-brown blotch near the middle, and a long oblique band of the same colour, commencing in a point at the extreme apex of the wing, and

gradually growing wider until it reaches the margin, where it is very broad: hind wings pink, with a black blotch at the base, and a black band half-way between this black blotch and the margin, and a snowy-white blotch at the anal angle: thorax and body olive-brown, with a white line on each side of the thorax just at the base of the wings; this line runs on each side along the head just above the eye, and the two meet at the nose; the body has on each side at the base two square black spots and two square white spots, and beyond them, nearer the apex, and also on each side, are three white lines. The caterpillar is smooth and black, with innumerable whitish dots; there are also eleven large spots of the same colour arrayed in a row on each side of the back, and beneath these as many spots of the same size and of a bright coral-red colour; the head is of the same coral-red colour, and a line of the same colour runs all along the back, from the head to the horn; the horn is red at the base and black at the tip. It feeds on the sea-spurge at Appledore and Braunton Burrows, near Barnstaple, where it was found by the late Mr. Raddon in abundance many years ago. The perfect insect has never been found in this country. The chrysalis is pale brown and delicately lined and dotted with black in the manner of network; it buries itself in the loose dry sand on the sea coast. The eggs are covered with liquid gum, which enables them to stick on the small leaves of the spurge. In a fortnight these hatch and produce little black caterpillars; the white and red spots appear as the caterpillar increases in size, and in a few weeks it becomes a most beautiful object, and so conspicuous as to attract the sea-gulls and terns, which devour them in numbers. We have never had the pleasure of finding either the caterpillar or perfect moth. Our description of the caterpillar is taken from the *Entomological Magazine*. (The scientific name is *Deilephila Euphorbiæ*.)



8.—The Bedstraw Hawk-Moth (*Deilephila Galii*).

♂. The Bedstraw Hawk-Moth.—Fore wings olive-brown, with a broad, irregular, whitish stripe along the middle; hind wings black at the base; then a broad pinkish-white band, quite white near the body, and bright pink about the middle; then a distinct black band, and then a grey margin; thorax and body olive-brown, a white line on each side of the thorax just at the base of the wings; this line runs on each side along the head just above the eye; sides of the body with black and whitish spots. The caterpillar is smooth, bluish-green above, inclining to pink beneath, sometimes brown and sometimes black, but always having a pale, almost yellow, line down the middle of the back, and a row of ten conspicuous eye-like yellow spots, on each side; the head is green, brown, or black, according to the colour of the caterpillar, but the horn above the tail is invariably red. Feeds on the Ladies' Bedstraw on sand-hills by the sea-coast, especially near Deal, and is not uncommon, but requires to be diligently sought after. The chrysalis is brown, and is found in the sand. The caterpillar feeds in August and September, and the Moth appears about Midsummer. (The scientific name is *Deilephila Galii*.)



9.—The Striped Hawk-Moth (*Deilephila livornica*).

9. The Striped Hawk-Moth.—Fore wings brown, with a pale margin, and a broad, irregular, whitish stripe along the middle; hind wings black at the base; then a broad, pink band, white next the body; then a broad distinct black band and a grey margin; the veins in the wings have a grey appearance; thorax and body brown, a greyish line on each side of the thorax, just at the base of the wings—this line runs along the head on each side just above the eye. The caterpillar is yellowish; with the head, the first segment of the body, a broad line along the back, and the whole of the belly intensely black; on each side is a series of crescent-shaped black markings, and a double row of bright orange spots. It is said to feed on the Ladies' Bedstraw and on the vine, but it is a very rare visitor in this country. Our description of the caterpillar is from the German. The chrysalis is pale brown. (The scientific name is *Deilephila livornica*.)

Note.—Most of the specimens in this country are Continental ones, sold by fraudulent dealers to the ignorant as the preceding species; but there are a few undoubtedly British examples of this beautiful Moth.



10.—The Silver-Striped Hawk-Moth (*Chærocampa Celerio*).

10. The Silver-Striped Hawk-Moth.—Fore wings brown, with a narrow silvery oblique stripe along the middle, commencing in a point at the extreme apex of the wing; this stripe is composed of four very delicate lines, the upper one of which is silvery; the hind margin of the wing has several delicate lines, and the veins of the wing are also silvery; hind wings pink at the base, the rest pink-brown, with two black bands, which are united by six black lines; thorax and body brown; thorax with an ash-coloured line on each side at the base of the wings, and two silvery lines; body with a row of white marks down the middle, and two silvery spots on each side of each segment. "Caterpillar green or purplish brown; on the fifth and sixth segments are two round black spots, dotted with yellow, and encircled with a yellow ring; those on the fifth segment larger. Horn brown, very slender, and quite straight. Feeds on the vine." We have never seen the cater-

pillar of this Moth; our description is extracted from Mr. Stainton's "Manual of British Butterflies and Moths." The author has copied it from Fryer. The perfect insect has occurred now and then in England, but can scarcely be regarded as a British insect. (The scientific name is *Chærocampa Celerio.*)

11. The Small Elephant Hawk-Moth.—Fore wings yellowish olive-brown, with pink blotches along the upper or costal margin, and a broad irregular pink outer margin; thorax and body rosy red, with the head, shoulders, and some indistinct patches along the middle of the body, olive-brown. The caterpillar is slightly rough, and either of a uniform brown or green colour, having a round black spot on each side of the fourth, fifth, and sixth segments; the spots on the fifth and sixth segments have a snow-white lunule in them; there is no horn above the tail. It feeds on the Ladies' Bedstraw, and is particularly fond of a chalky soil. The chrysalis is brown, the covering of the wing-cases darker than that of the body. The Moth is found in June, the caterpillar in August. (The scientific name is *Chærocampa Porcellus*).



11.—The Small Elephant Hawk-Moth (*Chærocampa Porcellus*).



12.—The Elephant Hawk-Moth (*Chærocampa Elpenor*).

12. The Elephant Hawk-Moth.—Fore wings olive-green, obliquely shaded with pink; hind wings black at the base, the rest pink; thorax and body olive-brown, the thorax with four longitudinal pink marks, the body with a pink central line and pink sides. Caterpillar green or brown, the males generally brown, with conspicuous black eye-like spots on each side of the fourth and fifth segments. Feeds on the large Willow Herb, which is so common on the sides of ditches, and also on Ladies' Bedstraw, and sometimes in gardens on Fuchsias. Chrysalis yellow-brown, marbled with black. The Moth occurs in June, the caterpillar in August. (The scientific name is *Chærocampa Elpenor.*)



13.—The Oleander Hawk-Moth (*Chærocampa Nerii*).

13. The Oleander Hawk-Moth.—Fore wings exquisitely varied and waved with green, and having numerous slender and oblique indistinct whitish lines traversing them in all directions; hind wings of the same beautiful colour, but browner at the base, and having a whitish line passing along the middle; body also green and shaded as beautifully as the wings. This noble and beautiful insect is not an inhabitant of Great Britain; but two or three specimens have been blown over from the coast of France, in which country it is not uncommon: this circumstance has induced our dealers to import these Moths in large quantities for the sake of imposing on rich and silly young collectors, who give almost any money for a rarity of this kind, little suspecting that it has just been imported from the Continent at a hundredth part of the price they are paying. The caterpillar is as beautiful as the Moth; it is green, orange, or brown, delicately marked with white dots; the second, third, and fourth segments are, however, always yellow, and the third has on each side a large round blue spot, with a black margin, and from this spot to the tail is a straight whitish band on each side; it has a short horn above the tail, bent backwards. It feeds on the Oleander. The Moth occurs in June and sometimes in October, the caterpillar in July, August, and September. (The scientific name is *Chærocampa Nerii*.)



14.—The Humming-Bird Hawk-Moth (*Macroglossa stellatarum*).

14. The Humming-Bird Hawk-Moth.—Fore wings smoke-coloured, with two slender cross-bars and a black dot between them; hind wings orange coloured, blackish at the base and brownish at the margin: thorax and body smoke-coloured, with black and white spots at the sides of the latter, and close to them black and white tufts of hair, which it spreads out when flying; the extreme end of the body has also a fringe of stiff black hairs. The flight of this insect is diurnal, and very beautiful. What is this, at our jasmine, with bird-like head, with brilliant eye, with out-spread and parti-coloured tail, humming loudly, and, though driven away, returning again and again, day after day, from the rising to the setting of the sun? It is the Humming-bird Hawk-Moth: from January to December we have some flower welcome to her, and she is welcome, most welcome to us and ours. The caterpillar is greenish or pinkish-brown, the sides in both cases inclining to blue, and sprinkled with white; and along each side is a straight pinkish or dirty white line, which terminates at the horn: below this is a second rather narrower and less conspicuous line, of a duller colour; the horn is thin, sharp-pointed, straight and upright; it feeds on the Ladies' Bedstraw. The chrysalis is brown, and found just below the surface of the ground. (The scientific name is *Macroglossa stellatarum*.)



15.—The Broad-Bordered Bee Hawk-Moth (*Macroglossa fuciformis*).

15. The Broad-Bordered Bee Hawk-Moth.—Fore wings transparent, with a brown oblique spot in the centre, a black base tinged with green, and a broad red-brown margin; hind wings transparent, with a red-brown margin; thorax and base of the body olive-brown; middle of the body red-brown, in the form of a belt; the remainder, to the tail,

olive-brown, with black tufts on the sides, which it spreads out in flying. This Sphinx is a true lover of the sun; its flight is only in his rays; he who has not seen this fairy creature pendulizing over a purple patch of the common bugle—anon descending to sip, without alighting, the sweets of each corolla; he who has not watched its porrected tube dive into cup after cup, its body the while motionless, its legs shivering, and its wings invisible and undefined through rapidity of motion; he who has not seen it again rise, and again pendulize, and then dart off with immeasurable speed—he who has not witnessed these things, has a delight yet to come: let him explore the woods of Kent during the month of May, when the air is calm and sunny, and he will truly be gratified. The caterpillar is bluish-green or brown, sprinkled over with minute raised points, which are generally whitish; having also an obscure line down the back, and a distinct white and pink line along each side, terminating at the horn, which is rough and slightly bent down. It feeds on the common Lychnis, the Wood Scabious, the Ladies' Bedstraw, and other low herbs, and spins a rather loose web on the surface of the ground, changing to a brown chrysalis. The Moth appears in May, the caterpillar throughout the autumn. (The scientific name is *Macroglossa fuciformis*)



16.—The Narrow-Bordered Bee Hawk-Moth (*Macroglossa bombyliformis*).

16. The Narrow-Bordered Bee Hawk-Moth.—Fore wings transparent with a narrow brown margin; hind wings transparent, with a very narrow, almost thread-like, brown margin; thorax and base of the body yellowish olive-brown; middle of the body, with two narrow black bands followed by a broader fulvous band; remainder of the tail fulvous, with tufts of black hairs on the sides, which it spreads out in flying. The caterpillar we have never seen. Mr. Stainton thus describes it, after Duponchel: "Green dotted with yellowish white; two rows of dull reddish spots on each side of the fifth to twelfth segments; the white spiracles are placed in the lower row of reddish spots; horn slightly rough, short, pointed, reddish; legs reddish, except the anal pair, which are green; feeds on the Field Scabious." Not uncommon, more particularly in the northern counties; the Moth appears in May. (The scientific name is *Macroglossa bombyliformis.*)

NOTE.

Among the British *Sphingidæ* the species of *Smerinthus* may be known by their body being brown without ornamental spots on the sides; the proboscis is rather slender and short; the outline of the wings waved and irregular, and the hind wings have no black bands. The genus *Acherontia* has the body brilliantly variegated, the proboscis short and very thick; the outline of the wings regular, without notches and indentations, and the hind wings have black bands. The genus *Sphinx* has the sides of the body beautifully variegated—red, black, and white; the proboscis enormously long; the outline of the wings regular; and the hind wings have black bands.

THE SESIDÆ

17 The Red-Belted Clearwing (*Sesia Myopæformis*).
18. The Large Red-Belted Clearwing (*Sesia Culiciformis*).
19. The Red-Tipped Clearwing (*Sesia Formicæformis*).
20. The Fiery Clearwing (*Sesia Chrysidiformis*).
21. The Six-Belted Clearwing (*Sesia Ichneumoniformis*).
22. The Yellow-Legged Clearwing (*Sesia Cynipiformis*).
23. The Currant Clearwing (*Sesia Tipuliformis*).
24. The Orange-Tailed Clearwing (*Sesia Andreniformis*).
25 The Welsh Clearwing (*Sesia Scoliæformis*).
26. The White-Barred Clearwing (*Sesia Sphegiformis*).
27. The Dusky Clearwing (*Sesia Vespiformis*).
28. The Hornet Clearwing of the Osier (*Sesia Bembeciformis*).
29. The Hornet Clearwing of the Poplar (*Sesia Apiformis*).

The next group of *Lepidoptera* we shall divide into three families. The caterpillars throughout the group are very much alike in shape and colour, and are exactly alike in their food and habits; but the perfect insects are very unlike—so much so, indeed, that it requires a good deal of confidence in our instructors to feel sure that they have done right in placing them together. We must, however, never forget that Great Britain is a very small part of the whole world, and of course contains only a very few of the insects; so that although, when we look at a collection of the insects of the whole world, we find that each one is very like that which is placed next to it, yet, when we turn to a collection of only British insects, we find them so few in number—many missing—that those insects that stand side by side are often so different, that we are apt to fancy that they have not been classified correctly.

The group of Moths now to be described have caterpillars that feed on the solid wood of trees, making mines and galleries in the timber, and at last so weakening the tree that it dies of the injury. Some are very large white maggots, and were formerly eaten by the Romans, and considered a great delicacy. They were called *Cossus*, and hence Mr. Newman, who first united this group of Moths into one tribe, called them *Cossites*. Some of the largest of these caterpillars live for four or five years, devouring wood all the time; and you can scarcely find the trunk of an old willow tree that is not completely riddled by these voracious creatures; some, however, eat only the roots, and others only the pith, but they all follow their destructive work quite out of sight, and are never to be found eating leaves, like the beautiful caterpillars of the Hawk-Moths. Each caterpillar changes to a chrysalis in the mine which it has made, and is furnished at every segment with a ring of little hooks, which enables some of them to move up and down in their galleries with almost as much ease as the caterpillars. It is a very curious sight to see one of these chrysalises wriggle up and down a reed, on the interior of which the caterpillar fed. As we have already said, we shall divide these Moths into three very different families: the first of them we call *Sesidæ*, or Clearwings.

Of all our British Moths, the *Sesidæ* are the most elegant, graceful, and fairy-like. Unlike almost all other Moths, they fly in sunshine; and nothing can exceed the grace and beauty of their motions, as they hover over a flower, or walk over its petals or leaves, gently waving their transparent and sylph-like wings Almost every character by which we distinguish large divisions of insects is subject to exceptions; and although we have said that Moths are nocturnal, we have here a family of Moths that are true lovers of sunshine: they constitute the exception to the rule. The most remarkable character, however, that belongs to these Moths is this—they seem to have no similarity at all to other Moths, but rather resemble gnats, and bees, and wasps, and a variety of other insects. Their antennæ are rather long, and rather thickest beyond the middle, and in the males they are what is called slightly ciliated—that

is, they have a row of very short bristles all along one side—very short indeed—so short as hardly to be seen without a magnifying glass; the wings are narrow and transparent; the body long, and banded with white, yellow, orange, or bright red belts, and they generally have a tuft of hairs at the tail, which is spread out like a fan when the insect is hovering over a flower; the legs are long, and hang down like those of a gnat when the insect is flying. Our young readers are requested to observe that in our description of these Moths, we say nothing about the hind wings, because they are all so much alike—quite transparent, with black rays and black margin.



17. The Red-belted Clearwing (*Sesia Myopæformis*).

17. The Red-Belted Clearwing.—Fore wings transparent, with a broad black tip and a black bar a little beyond the middle; thorax and body black, the latter having a bright-red belt just about the middle. The caterpillar feeds in the solid wood of pear trees, and in the more slender branches of apple trees. We have seen between sixty and seventy in a piece of pear-tree wood about three inches long. The caterpillar feeds all the year; the Moth is common in gardens in May, June, and July. (The scientific name is *Sesia Myopæformis*.)



18.—The Large Red-Belted Clearwing (*Sesia Culiciformis*).

18. The Large Red-Belted Clearwing.—Fore wings transparent, with a broad black tip and a black bar a little beyond the middle, and some very delicate bright-red markings at the base; thorax and body black, the latter with a bright-red belt about the middle. The caterpillar feeds on the wood of birch-trees, preferring the stumps of trees that have been cut down; it feeds all the year: the Moth is only to be found in May and June. This and the preceding are very much alike, but this may be immediately distinguished by the minute red marks at the base of the fore wings: it is also the larger of the two. (The scientific name is *Sesia Culiciformis*.)



19.—The Red-Tipped Clearwing (*Sesia Formicæformis*).

19. The Red-Tipped Clearwing.—Fore wings transparent, with a broad red tip and a black bar a little beyond the middle: thorax and body black, the latter with a deep-red belt about the middle. The caterpillar feeds inside the twigs of osiers, and sometimes does a good deal of mischief in osier-beds where the twigs are grown for basket-making; it feeds throughout the autumn and winter: the Moth appears about Midsummer. This Moth also resembles a good deal the two previous ones, but the red tip of the wing is an unmistakable character. The scientific name is *Sesia Formicæformis*.)



20.—The Fiery Clearwing (*Sesia Chrysidiformis*).

20. The Fiery Clearwing.—Fore wings with the costal and apical margins black: there is also a black bar a little beyond the middle; the space between this bar and black apex is bright orange-red, and the inner margin of the wing is of the same beautiful colour: thorax and body black, the latter with two narrow yellow belts near the tail; the tail-fringe black at the sides, and bright orange-

coloured in the middle. We know nothing of the caterpillar of this beautiful insect. (Its scientific name is *Sesia Chrysidiformis.*)



21.—The Six-Belted Clearwing (*Sesia Ichneumoniformis*).

21. The Six-Belted Clearwing.—Fore wings transparent, with brownish margins, and a brown bar just beyond the middle; the space just within the tip is yellowish; the thorax is black, with two indistinct yellow lines; the body black, with six narrow yellow belts; the tail-fringe is black and inconspicuous. The caterpillar feeds in the stems of the Stinking Hellebore, and lives through the winter: the perfect insect occurs in June and July, and is not uncommon at the top of the cliff about Ramsgate and Margate; it used to be abundant in the sand-pit at Charlton, but the Hellebore has been destroyed. (The scientific name is *Sesia Ichneumoniformis.*)



22.—The Yellow-Legged Clearwing (*Sesia Cynipiformis*).

22. The Yellow-Legged Clearwing.—Fore wings with a black margin, and a black bar near the middle, the inner half of which is black, the outer half orange; head black, with a yellow ring round the neck; thorax black, with two bright yellow lines; body black, with four yellow belts—the male has the tail-fringe black, the female golden yellow. The caterpillar lives in the bark of elm and oak trees; it feeds through the winter. The Moth appears at Midsummer, and is common in Kensington Gardens and Hyde Park. (The scientific name is *Sesia Cynipiformis.*)

23. The Currant Clearwing.—Fore wings margined with black, and having a black bar



23.—The Currant Clearwing (*Sesia Tipuliformis*).

just beyond the middle; tip yellowish, with black veins; thorax black, with two narrow yellow lines; body black, with three narrow yellow belts; tail-fringe entirely black. The caterpillar feeds on the pith of the twigs of currant-bushes, and is too common, causing the death of the shoots wherever it occurs: it is to be found alive throughout the winter by splitting open these twigs; the Moth appears in June. (The scientific name is *Sesia Tipuliformis.*)



24.—The Orange-Tailed Clearwing (*Sesia Andreniformis*).

24. The Orange-Tailed Clearwing.—Fore wings with black margins and tip, and a black bar just beyond the middle; thorax and body black; the latter with one distinct and one indistinct white or pale-yellow belt. Tail-fringe brilliant orange, and very large. The caterpillar is quite unknown, and the Moth extremely rare; a single specimen was taken last year, flying by night near Market Harborough, by the Rev. A. Matthews, and is now in that gentleman's very valuable collection. (The scientific name is *Sesia Andreniformis.*)



25.—The Welsh Clearwing (*Sesia Scoliæformis*).

25. The Welsh Clearwing.—Fore wings transparent; with the margins, tip, and a

large almost triangular blotch in the middle, black; antennæ, of the female only, whitish before the tip; thorax black, with two pale yellow lines; body black, with two yellow belts; tail-fringe black, with a few yellow hairs. The caterpillar feeds on the wood of birch trees; the Moth appears in June, and has only been found by the late Mr. Ashworth, near Llangollen, in North Wales. (The scientific name is *Sesia Scoliæformis.*)



26.—The White-Barred Clearwing (*Sesia Sphegiformis*).

26. The White-Barred Clearwing.—Fore wings transparent, with black margins, and a black bar just beyond the middle; antennæ in both sexes with a white space just before the tip; thorax and body black, the latter with two white belts, the first a very narrow one at the base, the second a broad one in the middle: tail-fringe black. The caterpillar feeds on the stems of the alder; the Moth appears in May and June, and is exceedingly rare. (The scientific name is *Sesia Sphegiformis.*)



27.—The Dusky Clearwing (*Sesia Vespiformis*).

27. The Dusky Clearwing.—Fore wings opaque, blackish; head black, with a yellow neck, thorax and abdomen black, the latter with three equi-distant, distinct yellow belts, and between each two an extremely slender narrow line; tail-fringe black. The caterpillar feeds on the roots of ash and aspen trees; the Moth appears in June, and is exceedingly rare (The scientific name is *Sesia Vespiformis.*)



28.—The Hornet Clearwing of the Osier (*Sesia Bembeciformis*).

28. The Hornet Clearwing of the Osier.—Fore wings transparent, tinged with yellow; head brown, with a yellow neck; body yellow, with a brown belt at the base, and another near the middle; no tail-fringe; legs orange. The caterpillar feeds on the wood of osier, spinning a tough cocoon in twigs so small that they seem scarcely large enough for the purpose: the Moth appears at Midsummer. (The scientific name is *Sesia Bembeciformis.*)



29.—The Hornet Clearwing of the Poplar (*Sesia Apiformis*).

29. The Hornet Clearwing of the Poplar.—Fore wings transparent, tinged with yellow; head yellow; thorax brown, with a square patch of bright yellow on each side in front; body yellow, with a brown belt near the base, and another near the middle; legs deep-orange. The caterpillar feeds on the solid wood of aspens and poplars, and lives often concealed for two years; when full-fed, it spins a tough cocoon, made of silk and the chips of the poplar, often near the ground; the Moth appears about Midsummer, and is exactly like a hornet in size, colour, and shape; indeed, it would be difficult to distinguish it from a hornet, were it not for its soft, downy covering, so different from the hard case of a hornet. (The scientific name is *Sesia Apiformis.*)

FAMILY III.—THE ZEUZERIDÆ.

30. The Reed Moth (*Macrogaster Arundinis*).
31. The Leopard Moth (*Zeuzera Æsculi*).
32. The Goat Moth (*Cossus ligniperda*).

THE THIRD FAMILY of British Moths is called *Zeuzeridæ*, from *Zeuzera*, the most familiar genus. We have already said how unlike each other are the three families which constitute the tribe *Cossites*; scarcely less unlike are the three Moths which, in this country, represent the family *Zeuzeridæ*; they agree, however, in some very essential characters; all the caterpillars feed inside trunks and stems, and they are all unsightly and most destructive maggots; they have hard and horny heads, and a horny plate on the segment next the head. The chrysalises have a series of little hooks on each segment. In the perfect or Moth state, all the females have a long, polished, hard, and piercing ovipositor, with which they deposit their eggs deep in the crevices of the bark of trees.



30.—The Reed Moth (Male) (*Macrogaster Arundinis*).

30. THE REED MOTH.—Fore wings pale brown, the rays being slightly paler, and somewhat raised, and the spaces between them sprinkled with extremely minute black dots; the hind wings pale brown; thorax and body of the same pale brown colour as the wings; the body very long in the female, very much exceeding the wings in length; the antennæ of the male are slender, and almost like a hair at the tip, but fringed at the base like a double comb; those of the female are slightly fringed throughout their length. The caterpillar is dingy white, inclining to yellow, and feeds in the interior of the common reed (*Arundo Phragmites*). This insect has only been found in two localities—Holme Fen in Huntingdonshire, and Whittlesea Mere, in Cambridgeshire—but in these places it was formerly abundant. The female, as we have said, has a remarkably long body; she flies low, slowly, and steadily, with this extraordinary body hanging down. She settles on a stem of a reed, running up and down, and incessantly vibrating her wings, while she



The Reed Moth (Female).

seems to be feeling about with the curious ovipositor we have mentioned as characteristic of the tribe, as though seeking for a suitable place in which to deposit her egg. The egg is placed on end, as observed by Mr. Harding, and is glued to the stem of the reed by a strongly adhesive fluid secreted in the insect, which dries the moment the egg is laid: in this position the head of the little caterpillar is placed nearest the stem of the reed, into which it eats its way directly it leaves its egg-shell: it enters almost close to the ground and eats upwards; the Moth lays but one egg in one reed stem: the chrysalis is very long, shaped much like that of a gnat, and is very rough to the touch, owing to the circles of little hooks which surround each segment: by means of these hooks it wriggles up and down the interior of the reed stem. The Moth comes out in June, and Mr. Doubleday says that it leaves the chrysalis at ten o'clock in the evening. This Moth is a favourite food of the black-headed Bunting (*Emberiza schœniclus*); but when it escapes this bird, it only lives a few days. (The scientific name is *Macrogaster Arundinis.*)



Head of Male. 31.—The Leopard Moth (Female) (*Zeuzera Æsculi*).

31. The Leopard Moth.—So called from its beautifully-spotted wings. The fore wings are almost white, with very many blue-black roundish spots ; the hind wings are similarly coloured and marked, but the spots are less distinct : all the wings have a semi-transparent appearance : thorax almost white, with six large roundish black spots ranged in three pairs, and another smaller spot between the last pair ; body grey : antennæ of the male slender and hair-like at the tip, but fringed at the base like a double comb. Caterpillar whitish, with black glossy spots, and having a blackish plate on the first segment behind the head ; it feeds on the solid wood of elm, apple, pear, and plum trees, but never to such excess as to destroy them. We have even observed that fruit trees thus infected bear more abundantly than those which are perfectly healthy. The caterpillar feeds through the winter, turning to a chrysalis in May. The Moth appears at Midsummer, and may be found by searching diligently the stems of infected trees early in the morning : the male comes to light, and may be found in the morning on the gas lamps. (The scientific name is *Zeuzera Æsculi.*)



32.—The Goat Moth (*Cossus ligniperda*).

32. The Goat Moth.—So called from the caterpillar having a very pungent disagreeable smell, like that of a he-goat. Fore wings rich brown, beautifully varied and mottled, the darker markings being dispersed in waved lines, placed transversely to the rays ; hind wings pale dingy brown, having markings something like those on the fore wings, but less distinct ; antennæ, slightly fringed throughout in both sexes, dark brown ; head also dark brown, with a nearly white ring round the neck ; thorax dark brown in front, shaded to whitish grey in the middle, and having a rather narrow black band behind ; body brown and grey in alternate rings. Caterpillar flesh-coloured, with a black head and broad dull red stripe down the back ; feeds on the solid wood of willows, elms, oaks, lilacs, and other trees, living for four years ; it has caused the death of many valuable elms ; and a small beetle (*Scolytus Destructor*) breeding abundantly in the bark of the dying trees, the injury has been erroneously attributed to this beetle, and not to the true cause, which, feeding and carry-

ing on its work of devastation out of sight, has escaped the notice of superficial observers; before changing to a chrysalis it spins a very large tough cocoon, composed of silk mixed with fragments of gnawed wood. This caterpillar is the Cossus of Pliny and the Roman epicures. (The scientific name is *Cossus ligniperda*.)

FAMILY IV.—THE HEPIALIDÆ.

33. The Gold Swift (*Hepialus hectus*).
34. The Common Swift (*Hepialus lupulinus*).
35. The Wood Swift (*Hepialus sylvinus*).
36. The Northern Swift (*Hepialus Valleda*).
37. The Ghost Swift (*Hepialus humuli*).

The Fourth Family of Moths (*Hepialidæ*) contains but five British species, most of them distinguished by their rapid flight, and hence called Swifts. They are all remarkable for the very short and simple antennæ, a character that will be made very obvious from our figures.



33.—The Gold Swift (*Hepialus hectus*).

33. The Gold Swift.—Fore wings tawny, with two oblique rows of silvery white spots, the outer interrupted, angled, and irregular; hind wings smoke-coloured, with pale fringe; head, thorax, and body fulvous brown: the female has the markings on the fore wings very indistinct. Caterpillar dirty white; feeds on the roots of plants in hedges and woods. The Moth flies directly after the sun is set, and with a restless sportive kind of flight, as though for pleasure, and not with that steady business-like air which a moth assumes when going to suck the honey of flowers or in search of its mate. The caterpillar feeds in the winter and spring, turns to a chrysalis in May and the Moth flies at Midsummer. (The scientific name is *Hepialus hectus*.)

34. The Common Swift.—This common insect is so extremely variable in colour that it is almost impossible to write such a description as shall agree with half-a-dozen specimens taken consecutively. Fore wings brown, with a row of irregular whitish spots, which runs from the tip to the middle of the inner margin, and then turns inwards towards the base; hind wings smoke-coloured, with pale fringes:



34.—The Common Swift (*Hepialus lupulinus*).

such is the more general appearance of the male. The female has scarcely any variety of colour, the fore wings being dingy brown, the hind wings smoke-coloured; head, thorax, and body, dingy brown. Caterpillar dirty white, with dark plates on the segments nearest the head: it feeds on roots of the dead nettles (*Ballota fœtida*, *Lamium album*, &c.) throughout the winter; changes to a chrysalis in May, and the Moth appears in June, darting swiftly about every hedgerow. (The scientific name is *Hepialus lupulinus*.)



35.—The Wood Swift (*Hepialus sylvinus*).

35. The Wood Swift.—Fore wings tawny, with a rather obscure whitish line running from near the tip to near the middle of the inner margin, and then turning inwards towards the base of the wing; these white marks are bordered with dark brown, and within the triangle formed by these marks is a very obvious

brown spot; the fringes of the fore wings are orange-coloured and unspotted; hind wings dusky brown, with orange-coloured fringe; thorax and body orange-brown. The female is larger than the male, the colour is duller, and the markings much less conspicuous. No one has discovered the caterpillar of this common Moth, which occurs in the perfect or Moth state in July. (The scientific name is *Hepialus sylvinus*.)



36.—The Northern Swift (*Hepialus Velleda*).

36. The Northern Swift.—Fore wings mahogany-brown in the male, obscure brown in the female; in both sexes there is a pale broad oblique band running from the tip to the inner margin; the upper or outer end of this band is forked, one branch terminating in the extreme tip, the other in the costal margin; there are other pale markings of uncertain situation nearer the base of the wing; the fringes are paler and spotted with dark brown; thorax and body dull brown. A dull, ugly-looking insect. The caterpillar feeds through the winter in the subterraneous rhizome of the common Brake. (*Pteris aquilina*.) The Moth appears in July, and swarms in some parts of the North of England, in Scotland, and in the Western Isles; near Stromness in Orkney, a dozen may be taken in the season with one sweep of the collecting net. We have never taken it in the South of England. (The scientific name is *Hepialus Velleda*.)



37.—The Ghost Swift (Male) (*Hepialus humuli*).

37. The Ghost Swift.—So called from the white colour of the male. All the wings of the male silvery white; fore wings of the female yellow, with orange markings; hind wings smoke-coloured at the base, but becoming tawny towards the margin; head, thorax, and body tawny. Caterpillar dirty white, the segment nearest the head with a brown plate;



The Ghost Swift (Female).

feeds on the roots of Burdock (*Arctium Lappa*), Stinging Nettle (*Urtica divica*), and Dead Nettle (*Ballota fœtida*), and (*Lamium album*), abundant in the South of England about Midsummer. (The scientific name is *Hepialus humuli*.)

FAMILY V.—THE COCHLIOPODIDÆ.

38. The Triangle Moth (*Limacodes Asellus*). | 39. The Festoon Moth (*Limacodes Testudo*).

THE FIFTH FAMILY of Moths is called *Cochliopodidæ*, from two Greek words, signifying "snail" and "foot," because the caterpillar resembles a snail, crawling along the surface of the leaf on which it feeds. The flat part of a snail on which it crawls is called the "foot:" the feet of these caterpillars are retractile, so when one of them is turned on its back, the legs appear to be withdrawn into its stomach; but when again placed in its natural position, the feet are protruded, and take firm hold of the leaf. The caterpillars spin a silken cocoon among the oak trees, and in this change to a chrysalis.



Female. Male.

38.—The Triangle Moth (*Limacodes Asellus*).

38. THE TRIANGLE MOTH.—Fore wings of the male dark brown, with two oval black spots, scarcely perceptible in some specimens; hind wings almost black, unspotted; fore wings of the female yellow-brown, unspotted; hind wings dark brown, unspotted; the female is considerably larger than the male. The caterpillar is something like a wood-louse, and sits close on the surface of the leaves of the oak on which it feeds; it is of a yellow-green colour, with a yellow stripe down the middle of the back, and has a number of shining pimples of a pinkish hue: it feeds in August and September, and spins up in October; it remains in the chrysalis state all the winter and spring, and the Moth comes out at Midsummer. It is only found in the New Forest in Hampshire, where a collector of the name of Turner has taken it in immense quantities. (The scientific name is *Limacodes Asellus.*)



Male. Female.

39.—The Festoon Moth (*Limacodes Testudo*).

39. THE FESTOON MOTH.—Fore wings of the male yellow-brown, with two narrow brown stripes: the first is oblique, running from the middle of the costal margin to near the base of the inner margin; the second is quite straight, appearing to cut off the tip of the wing: between these two, on the inner margin, is a short oblique stripe of the same colour; hind wings dark brown, unspotted. Female larger; fore and hind wings both inclining to clay-yellow. Antennæ of both sexes yellow; head and thorax clay-yellow, body browner. The caterpillar feeds on the oak from July to September; its shape is something like that of a wood-louse, but it still more resembles those common little sea-shells which are called Chitons: it is of a more dusky green colour, with a broad stripe down the back of a paler hue, and along each side of this is a row of shining pimples, rather pink. In October it spins on one of the oak-leaves a tough cocoon, brown outside, but most delicately white and silken inside; in this the caterpillar remains unchanged through the winter, but early in spring it changes to a yellow-brown chrysalis, which turns to a Moth in June; the female is very sluggish, sitting on the leaves of the oak, and when shaken into a net it drops like a little lump of yellow clay, and remains quite motionless, feigning death. We have repeatedly taken it in the woods of Kent, but never saw it fly; the male on the contrary flies rapidly through the woods in hot sunshine, generally against the wind and always in a zigzag direction. (The scientific name is *Limacodes Testudo.*)

FAMILY VI.—THE PROCRIDÆ.

40. The Forester (*Procris Statices*). | 41. The Scarce Forester (*Procris Globulariæ*).

THE SIXTH FAMILY of Moths is called *Procridæ*. The caterpillars are shaped a good deal like those of *Cochliopodidæ*, but their feet are more plainly to be seen, and the caterpillars themselves are downy or hairy: they spin cocoons on the leaves on which they feed. They are small but beautiful Moths, of a golden-green colour, very sluggish in dull weather, and commonly found settled on flowers; one plant in particular seems attractive to them, and that is the Mullein, on the yellow blossoms of which they may often be found settled, their rich golden-green wings forming a lovely contrast to the bright yellow of the flowers: they fly occasionally, but we have only seen them on the wing in very bright sunshine.



40.—The Forester (*Procris Statices*).

40. THE FORESTER.—Fore wings shining green, and semi-transparent; hind wings smoke-coloured; antennæ fringed in the male, and rather blunt at the tip; head, thorax, and abdomen golden green. The caterpillar short, stout, and downy, very dingy green, with a stripe of black spots down the middle of the back, and a pale stripe on each side; it feeds on the common Sorrel, and may be found in May and June; it spins a cocoon on the leaves or flower-stalk of Sorrel, and then turns to a chrysalis, in which state it remains but a few days, the Moth appearing at Midsummer. (The scientific name is *Procris Statices.*)



41.—The Scarce Forester (*Procris Globulariæ*).

41. THE SCARCE FORESTER.—Fore wings shining coppery green, and semi-transparent; hind wings smoke-coloured; antennæ fringed in the male, and pointed at the tip; head, thorax, and abdomen golden green. We are sorry to say we do not know the caterpillar or its food. (The scientific name is *Procris Globulariæ.*)

FAMILY VII.—THE ZYGÆNIDÆ.

42. The Transparent Burnet (*Zygæna Minos*).
43. The Broad-bordered Five-spotted Burnet (*Zygæna Trifolii*).
44. The Narrow-bordered Five-spotted Burnet (*Zygæna Loniceræ*).
45. The Six-spotted Burnet (*Zygæna Filipendulæ*).

THE SEVENTH FAMILY of Moths, called *Zygænidæ*, are remarkable for their beautifully-spotted fore wings, and their bright red hind wings. The caterpillars are stout and hairy, and spin silken cocoons on the stems of grasses, &c. These Moths, like the last, are slow and lethargic in dull weather, but are very beautiful objects when flying in the sunshine, the bright red of their hind wings being then fully displayed.



42.—The Transparent Burnet (*Zygæna Minos*).

42. THE TRANSPARENT BURNET.—Fore wings dull red, semi-transparent, with all the margins blackish dingy green; hind wings red, with a very narrow black border; antennæ club-shaped, very blunt at the tip; antennæ, thorax, body, and legs quite black. "The caterpillar is pale yellow or greenish, with two rows of twelve black spots on each side; its head and fore legs are blackish; it feeds on *Trifolium montanum*,—bird's foot trefoil, *Lotus corniculatus*,—and horse-shoe vetch, *Hippocrepis comosa*." We have quoted the description of the caterpillar as well as that of the following species from Mr. Stainton, who has translated them from Duponchel. The cocoon in which the caterpillar turns to a chrysalis is oval and blunt at both ends; it is of an earthy brown colour, and is glued on the stones which so abound in the county of Galway, where the insect is principally taken, as to be called the pavement formation, which consists of platforms of solid rock with narrow interstices of verdure between them: this is the character of extensive districts, and is apparently caused by the long-continued action of currents of water, which has removed all earthy substances. The Moths fly actively in the sunshine during the early part of the day, but after 4 o'clock P.M. they are to be captured with the greatest ease, as they sleep on the flowers; in some favoured spots every daisy will have its tenant, and as many as eight or nine are sometimes seen clustered on a single flower of the dandelion, giving it at a little distance, the appearance of a gorgeous crimson flower, enchanting alike to the naturalist and the painter. We are indebted for these observations to a gentleman who has paid great attention to the habits of this insect. The caterpillar is found in May, the chrysalis and Moth in June. This insect has not yet been found in England, but is most abundant in the west of Ireland, and also occurs both on the east and west coasts of Scotland. (The scientific name is *Zygæna Minos*.)



43.—The Broad-bordered Five-spotted Burnet (*Zygæna Trifolii*).

43. THE BROAD-BORDERED FIVE-SPOTTED BURNET.—Fore wings blackish green, with five red spots; two of them are close together at the base and are of an oblong form: two others, of a roundish form, are placed side by side about the middle of the wing; these two often touch each other; and beyond them, towards the tip of the wing, is a fifth almost

round, quite by itself: hind wings crimson red, with a broad black border; antennæ, thorax, and body black; the antennæ are club-shaped, and blunt at the tip, but not quite so blunt as in the Transparent Burnet. "Caterpillar green or yellowish green, with two dorsal rows of black spots on each side; it feeds on the horse-shoe vetch, *Hippocrepis comosa*, bird's-foot trefoil, *Lotus corniculatus*, and *Trifolium procumbens*." The caterpillar is found in May and the Moth in June. (The scientific name is *Zygæna Trifolii*.)



44.—The Narrow-bordered Five-spotted Burnet (*Zygæna Loniceræ*).

44. THE NARROW-BORDERED FIVE-SPOTTED BURNET.—Fore wings blackish green, glittering in the sun, and having red spots; two of them, close to the base, are of an oblong form, two others, of a roundish form, are placed side by side about the middle of the wing; these two are generally quite distinct and separate, and beyond them, towards the tip of the wing, is a fifth, almost round; hind wings crimson-red with a black border; antennæ black and club shaped, but the club is pointed; thorax and body black. This insect, as may be seen both by the figure and description, is very much like the last, and when you have only a single specimen it is difficult to say to which it properly belongs; but when you have ten or twenty of each, you will see that the antennæ of this are more pointed, the fore wings rather more pointed also, and the border of the hind wings distinctly narrower. The caterpillar is hairy, yellowish green speckled with black, yellow on the sides, paler as it becomes full-grown; it feeds on clover and grasses; the chrysalis is brownish; it is contained in a yellow silken cocoon, which is spun on the stem of the clover or a blade of grass. The caterpillar is found in May, and the Moth in June. (The scientific name is *Zygæna Loniceræ*.)



45.—The Six-spotted Burnet (*Zygæna Filipendulæ*).

45. THE SIX-SPOTTED BURNET.—Fore wings glossy, metallic blackish green, with six bright red spots placed exactly as you observe them in the figure; that is, two oblong ones near the base, two roundish ones near the middle, and two roundish ones nearer the tip of the wing; hind wings crimson red, with a narrow black border; antennæ club-shaped and rather sharp-pointed; antennæ, thorax, and body black, beautifully tinged with green. Caterpillar dingy yellow, stout and rather hairy; on each segment are two rows of black spots: it feeds chiefly on the Crowfoot Trefoil, and, when full fed, crawls up the flowering stem of some grass, and on this it spins a shuttle-shaped yellow silken cocoon, very sharp-pointed at both ends; within this it changes to a black chrysalis: the Moth appears the begining of June, and is a very beautiful object when flying in the sunshine. (The scientific name is *Zygæna Filipendulæ*.)

NOTE.

The spots on the wings of the Burnet Moths frequently *coalesce*, and then the marking is *band-like*. In that case four spots make one band.

FAMILY VIII.—THE NOLIDÆ.

46. The Short-cloaked Moth (*Nola cucullatella*).
47. The Least Black Arches (*Nola cristulalis*).
48. The Small Black Arches (*Nola Strigula*).
49. The Scarce Black Arches (*Nola centonalis*).

THE EIGHTH FAMILY of Moths (*Nolidæ*) contains but four species that have yet been found in Great Britain. They are of small size and somewhat triangular in shape: they sit on the trunks of trees in the day-time, and fly only in the evening and during the night. The caterpillars are hairy, and, as far as we have yet observed, feed on the leaves of trees: they spin a silken cocoon and do not bury themselves in the ground to undergo their change to a chrysalis.



46.—The Short-cloaked Moth (*Nola cucullatella*).

46. THE SHORT-CLOAKED MOTH.—Fore wings pearl-grey, with a dark blotch at the base, a small triangular spot on the costal margin, and several wavy indistinct streaks parallel with the outer margin; hind wings grey, without markings. Caterpillar dingy brown, with paler patches down the back, so arranged as to form a kind of stripe; it is covered with numerous wart-like protuberances, each of which emits a little tuft of hair: it feeds on the blackthorn, and on plum-trees in gardens. The Moth first appears about Midsummer, and may be found throughout July; it is very common. (The scientific name is *Nola cucullatella.*)



47.—The Least Black Arches (*Nola cristulalis*).

47. THE LEAST BLACK ARCHES. — Fore wings grey, slightly darker towards the hind margin; there are several waved slender angular black lines across the wing, from the costal to the inner margin; between the first and second of these is a dark mark on the margin. Caterpillar dull yellow and hairy, with fine blackish lines running lengthwise from end to end: it feeds on oak, and spins up towards the end of May, the Moth appearing in June. (The scientific name is *Nola cristulalis.*)



48.—The Small Black Arches (*Nola Strigula*).

48. THE SMALL BLACK ARCHES.—Fore wings grey, slightly darker towards the hind margin, and marked with several slender waved black lines, hind wings smoke-coloured: this insect is rather larger than the last; the inner line on the fore wing is less angular, and the hind wings are darker than in that species; the two are extremely alike, but, nevertheless, an entomologist does not fail at once to see the difference. The caterpillar is very hairy, and of a dingy yellow colour; Freitschke says there is a black blotch on the eighth segment: it feeds on oak, and spins up in May; the Moth is found on the trunks of trees in June. (The scientific name is *Nola Strigula.*)



49.—The Scarce Black Arches (*Nola centonalis*).

49. THE SCARCE BLACK ARCHES. — The fore wings are pure white, with three transverse waved lines passing completely across them, from the costal to the inner margin; that nearest the base is sharply angled in the middle, the angle pointing towards the tip of the wing; the second and third are near together, and are parallel with the hind margin; between the first and second is a short double mark on the costal margin; hind wings pearly white, delicately tinted with a rosy hue; the head, antennæ, thorax, and body are perfectly white. We have no knowledge of the caterpillar or chrysalis. A single specimen of this pretty little insect came to light on the 1st July, 1858, at Bembridge, in the Isle of Wight. Mr. F. O. Standish is reported to have taken a second specimen. (The scientific name is *Nola centonalis.*)

FAMILY IX.—THE LITHOSIIDÆ.

50. The Round-winged Muslin (*Nudaria Senex*).
51. The Muslin (*Nudaria mundana*).
52. The Dew Moth (*Setina irrorella*).
53. The Rosy Footman, or Red Arches (*Calligenia miniata*).
54. The Four-dotted Footman (*Lithosia mesomella*).
55. The Dotted Footman (*Lithosia muscerda*).
56. The Orange Footman (*Lithosia aureola*).
57. The Pigmy Footman (*Lithosia pygmæola*)
58. The Buff Footman (*Lithosia helvola*).
59. The Common Footman (*Lithosia complanula*).
60. The Scarce Footman (*Lithosia complana*).
61. The Dingy Footman (*Lithosia griseola*).
62. The Pale Footman (*Lithosia stramineola*).
63. The Four-spotted Footman (*Lithosia quadra*).
64. The Red-Necked Footman (*Lithosia rubricollis*).
65. The Feathered Footman (*Eulepia grammica*).
66. The Speckled Footman (*Eulepia Cribrum*).

THE little family of *Nolidæ* we should have included with the larger family which here follows and is called *Lithosiidæ*, but Mr. Doubleday, in the work mentioned below, has separated them, and no one is so well acquainted with the subject. At this point of our History of British Moths we should like to make an observation on the English names. We consider these names are often very silly and unmeaning, but still we use them, because we do not wish our juvenile readers to be deterred from the study of Entomology, which is a truly delightful study, by long Latin words, very often without any meaning, and sometimes also difficult to pronounce; still, as these names must be learned by-and-by, we always add them at the end of each description. These names we obtain from aprinted catalogue, called "A List of British Butterflies and Moths," by Henry Doubleday. This is the most perfect and complete scientific work ever published in this country; and, although it costs two shillings, we recommend every one of our young entomological friends to buy it, because it will enable them to obtain a thorough knowledge of the mode of arranging these beautiful objects. The list can be bought of every bookseller and naturalist in the kingdom, and one copy will last a lifetime. Mr. Henry Doubleday, the author, lives at Epping, and knows more of British Butterflies and Moths than all the other Entomologists in the kingdom; he never sells nor deals in books or insects, but has acquired all his knowledge solely to gratify his ardent love of the science, and for the purpose of instructing others—an example we cannot too highly recommend to our entomological friends.

There are seventeen British Moths belonging to the NINTH FAMILY, *Lithosiidæ:* they are all small and rather insignificant in their appearance; their form, when at rest, is long and narrow, the fore wings folding over one another, and all the wings wrapping closely round the sides of the body. When collecting insects in the bright summer time, we have often seen these little Moths fall into the net we have held beneath, while we tapped the bough of an oak-tree; they generally pretend to be dead, and then so much resemble little bits of stick that it requires a little practice to detect them. Many insects have this mode of simulating death, and thus escaping observation; for, if they move in the daylight, they are almost sure to attract the notice of some hungry bird who will snap them up in a moment. This means of escape is doubtless an instinct bestowed by a beneficent Providence for the preservation of His creatures; thus, while some are protected by weapons of defence, others by size, and more still by their extreme activity, the safety of many a minute insect depends solely on its escaping notice by preserving a death-like quiet. The caterpillars generally feed on the lichen which we often see so beautifully clothing the bark of trees; they are generally covered with a number of little lumps like pimples, and from each of these spring a few hairs: more than half the caterpillars are, however, quite unknown to scientific observers.

50. THE ROUND-WINGED MUSLIN.—Fore



50.—The Round-winged Muslin (*Nudaria Senex*).

wings pale brown, with a few darker but not very distinct marks along the costal margin, and a brown dot in the centre of each ; hind wings still paler than the fore wings, and having a pale indistinct brown dot in the centre of each. The Moth appears in August. (The scientific name is *Nudaria Senex.*)



51.—The Muslin (*Nudaria mundana*).

51. The Muslin.—Fore wings pale smoky brown and semi-transparent, with two zigzag transverse lines, and a brown spot between them ; hind wings of nearly the same hue as the fore wings, but without markings. The caterpillar is rather hairy, and of a smoky-grey colour, with a paler stripe down the back , it feeds on tree lichens. The Moth appears in July, and is not uncommon. (The scientific name is *Nudaria mundana.*)



52.—The Dew Moth (*Setina irrorella*).

52. The Dew Moth.—Fore wings dingy orange-coloured, slightly transparent, with three oblique rows of black dots ; the first has three dots, the second four or five, and the third, an outer row, has no fixed number : hind wings unspotted. We have never found the caterpillar, and in those places where the Moth is most common, such as the Freshwater Cliff, in the Isle of Wight, there seems no suitable place for treelichens to grow. The Moth appears about Midsummer, and continues in tolerable plenty until the middle of August ; it flies in the early morning, and it is this, in all probability, which has given rise to the name of Dew Moth. (The scientific name is *Setina irrorella.*)



53.—The Rosy Footman, or Red Arches (*Calligenia miniata*).

53. The Rosy Footman, or Red Arches. —Fore wings pale red, with an oblique zigzag black line beyond the middle ; within this is a single conspicuous black dot, and beyond it an oblique row of black dots ; hind wings pale-rosy, unspotted. The caterpillar is brown and hairy ; it feeds in April and May on the lichens which grow on the boughs of oak-trees : the Moth comes out in July. (The scientific name is *Calligenia miniata.*)



54.—The Four-dotted Footman (*Lithosia mesomella*).

54. The Four-dotted Footman. — Fore wings pearly grey, the costal and hind margin brightly tinged with orange ; each has two black dots, one on the costal margin, the other near the inner margin : hind wings smoke-coloured, with a pale fringe. The Moth appears in June and July. (The scientific name is *Lithosia mesomella.*)



55.—The Dotted Footman (*Lithosia muscerda*).

55. The Dotted Footman.—Fore wings smoky grey, with a row of three black dots ; the first about the middle of the costal margin, the second and third in a line between that and the anal angle ; between these three and the inner margin, but nearer the base of the wing, are two other black dots ; hind wings of the same hue as the fore wings, but slightly

paler and unspotted. The Moth appears in August; and is only found in marshes; the chief locality, and the only one of which we can speak with certainty, is called Horning Fen, near Norwich. (The scientific name is *Lithosia muscerda.*)



56.—The Orange Footman (*Lithosia aureola*).

56. The Orange Footman.—Fore wings deep orange-coloured: hind wings paler. The caterpillar is hairy and dark smoke-coloured, with two parallel yellow-red spotted stripes down the back; it feeds on the lichen which grows on the larch-fir, and changes to a chrysalis under cover of the lichen; the Moth comes out about Midsummer, and is a beautiful and conspicuous object on the boles of the larch-trees, when it has just emerged from the chrysalis state. The scientific name is *Lithosia aureola.*)



57.—The Pigmy Footman (*Lithosia pygmæola*).

57. The Pigmy Footman.—Fore wings pearly grey, inclining, in the male, to smoke-colour, and have a yellow costal margin; hind wings smoke-coloured along the costal margin; the rest whitish. This very distinct little Moth was made known by Mr. Doubleday; hitherto it has only been found on the sea coast, near Deal. It appears in August. (The scientific name is *Lithosia pygmæola.*)



58.—The Buff Footman (*Lithosia helvola*).

58. The Buff Footman.—Fore wings of the male yellowish grey; hind wings of the same colour. Fore wings of the female yellow, tinged with smoke-colour, except along the costal margin, which is orange; hind wings tinged with smoke-colour. The caterpillar, according to Freitschke, is black, with a black-brown head; it has a yellow stripe on each side of the back, and in the last segment these stripes become broader, approach each other, and almost form a spot. It feeds on the lichens of the oak, especially in the New Forest, in Hampshire. This species is not common; the Moth appears in July. (The scientific name is *Lithosia helvola.*)



59.—The Common Footman (*Lithosia complanula*).

59. The Common Footman.—Fore wings smoke-coloured, with a bright yellow stripe on the costal margin, terminating in a point before it reaches the tip of the wing; hind wings delicately pale yellow. The caterpillar is hairy, almost black, and without spots; beneath, it has a reddish line on each side, just above the feet; it feeds on the lichens of oaks, blackthorns, and more rarely on those of the larch-fir: authors also speak of its frequenting poplars, and feeding on the lichens on walls, but we have never found it in such situations. This is the most common species, and may be met with in all the woods and lanes round London; we have found it in June, July, and August. (The scientific name is *Lithosia complanula.*)



60.—The Scarce Footman (*Lithosia complana*).

60. The Scarce Footman.—Fore wings smoke-coloured, with a bright yellow stripe on the costal margin, of equal breadth to the extreme tip of the wing; hind wings delicately

pale yellow. We are totally unacquainted with the caterpillar of this species, and doubt whether it has been seen in this country; but it has been described by Ochsenhiemer as being black with short hairs, and as having a stripe on each side of the back, composed of yellow, white, and red spots, and a narrow reddish line above the feet: it feeds on the lichens of blackthorn and firs. The Moth appears in July. (The scientific name is *Lithosia complana.*)



61.—The Dingy Footman (*Lithosia griseola*).

61. The Dingy Footman.—Fore wings smoke-coloured with a pearly gloss, the costal margin yellow hind wings pearly grey. The Moth appears soon after Midsummer, and is very common. (The scientific name is *Lithosia griseola.*



62.—The Pale Footman (*Lithosia stramineola*).

62. The Pale Footman.—Fore wings pale dull yellow; hind wings still paler, having a bleached appearance. This is in al probability a pale variety of the preceding; it occurs at the same time, in the same localities, and there is not the slightest difference in shape or size; but the colour is very different, and this has induced Mr. Doubleday to consider it a new species. (The scientific name is *Lithosia stramineola.*)



63.—The Four-spotted Footman (Male) (*Lithosia quadra*).

63. The Four-spotted Footman.—Fore wings of the male delicate pearly grey in the middle, bright yellow at the base, smoke-coloured at the hind margin, and having a short black stripe at the base of the costal margin; hind wings dingy yellow, smoke-coloured towards the tip. Fore wings of the female orange-coloured, with two conspicuous black spots on each; one on the costal margin, the other between this and the inner margin; hind wings yellow, unspotted. The caterpillar is nearly an inch and a half long, very hairy,



The Four-spotted Footman (Female).

of a grey colour, with yellow and black stripes; the stripes being bordered with red warts, from which spring the hairs. It is said by Berge to feed on fir, beech, oak, pear, apple, cherry, damson, roses, horse-chestnut, willow, lime, and various hedgerow plants; but may we not rather imagine that it is the lichens and not the foliage of the trees which it devours? It spins a thin white cocoon, either in crevices of the bark or between two leaves, and in this it changes to a shining black brown chrysalis, in which state it remains for eleven or twelve days only. The Moth appears in July and August, and frequently hybernates, laying its eggs in the spring. (The scientific name is *Lithosia quadra.*)



64.—The Red-necked Footman (*Lithosia rubricollis*).

64. The Red-necked Footman.—All the wings black; head black, witha red neck; body black, with a yellow tip. The caterpillar is hairy and grey, with black stripes, in which are red and white spots: it feeds on a variety of lichens. The Moth, singular from its black colour, appears in August. (The scientific name is *Lithosia rubricollis.*)



65.—The Feathered Footman (Male) (*Eulepia grammica*).

65. The Feathered Footman. — Fore wings of the male yellow, with a central black spot, and a number of parallel black longitudinal stripes, hind wings orange-coloured, with a central black lunule, a broad black marginal band, a bright orange fringe, and a few dusky streaks crossing the orange-colour in the middle. Fore wings of the female pale buff, with a black dot near the costal margin, and four or five narrow black streaks near the hind margin; hind wings orange-coloured with a few black streaks near the base, a central black dot, and a row of black dots just within the hind margin; antennæ black, feathered in the male; thorax yellow, with black longitudinal stripes; body yellow, with black spots. On the Con-



The Feathered Footman (Female).

tinent, especially in France and Germany, the caterpillar of this species is found throughout May, feeding on various grasses, on mugwort, on heather, and sometimes on oak-leaves; it is black, with white markings: on each segment are brown wart-like protuberances, from which spring short, reddish-yellow hairs. It spins a whitish-grey cocoon between leaves, in which it turns to a reddish-brown chrysalis, in which state it remains about twenty days, the Moth appearing at the end of June. We have no knowledge whatever of either caterpillar or Moth as natives of Great Britain, and have described them only out of respect to Mr. Doubleday, who places this insect in the "List of British Moths and Butterflies," to which we have already referred. (The scientific name is *Eulepia grammica.*)



66.—The Speckled Footman (*Eulepia Cribrum*).

66. The Speckled Footman.—Fore wings white, with four transverse zigzag black bands, each of which is almost divided into spots; two smoke-coloured stripes run from the base of the wing to the hind margin, passing through all four of the black bands; hind wings smoke-coloured. The caterpillar is black and hairy, with a whitish stripe down the back, and a slender white line on each side above the feet; it feeds on the common heather. The Moth appears in July, and has only been found in Dorsetshire and Hampshire: it was first discovered by Mr. Dale. (The scientific name is *Eulepia Cribrum.*)

FAMILY X.—THE EUCHELIIDÆ.

67. The Crimson Speckled (*Deiopeia pulchella*).
68. The Cinnabar (*Euchelia Jacobææ*).
69. The Scarlet Tiger (*Callimorpha Dominula*).

The Tenth Family of Moths is called *Eucheliidæ:* it contains but three British species, all of them extremely beautiful: the caterpillars are hairy. and spin a web in which their hairs are interspersed; the chrysalis is smooth; the Moth has thread-like antennæ without any fringe.

67. The Crimson Speckled.—Fore wings



67.—The Crimson Speckled (*Deïopeia pulchella*).

white, with a number of nearly square crimson and black spots, which are arranged in transverse but very irregular rows—the scarlet and black rows alternating with each other, five of scarlet and six of black; the hind wings are white, clouded along the margin with black; the antennæ are black, and also the eyes, but the crown of the head is red; there is a red collar round the neck, with two black spots on it; the thorax is whitish, with a central black spot, and on each side of it is a distinct tippet, which is red in the middle and black at each end: body white. The caterpillar, like the Moth, is very beautiful; the ground is lead-colour, with a covering of black hairs; there is a broad white stripe down the back, and on each segment down the side is a double scarlet spot. On the Continent of Europe, this caterpillar is said to feed on the Forget-me-not (*Myosotis arvensis*), but it has never been found in this country. The Moth appears in July. Mr. Doubleday has a single specimen, taken at Epping, and we believe there are two or three other British specimens in different cabinets. (The scientific name is *Deïopeia pulchella.*)



68.—The Cinnabar (*Euchelia Jacobææ*).

68. The Cinnabar.—Fore wings olive-brown, with a crimson stripe on each, very near the costal margin and parallel with it; a similar crimson stripe on the inner margin, and two round crimson spots on the hind margin; hind wings crimson, with a black margin: antennæ, head, thorax, and body, black. The caterpillar is deep orange ground-colour, with black head and black wings; it is hairy, but not so hairy as the rest of the family; it feeds on the common ragwort (*Senecio Vulgaris*) and is common everywhere. The chrysalis is smooth, short, thick, red-brown, and shining; it changes on the surface of the ground. The Moth appears in July; the males are much larger than the females. (The scientific name is *Euchelia Jacobææ.*)



69.—The Scarlet Tiger (*Callimorpha Dominula*).

69. The Scarlet Tiger.—Fore wings olive-brown, with a very beautiful metallic green gloss, and having about ten cream-coloured spots, very various in size and shape: those in the centre of the wing are rather orange-coloured; hind wings crimson with several black blotches. The markings are so different in shape and size in different individuals that it is difficult to write any description that would apply to every specimen. The combination of colours is truly lovely, and it is one of the most beautiful of known insects, whether British or foreign. The caterpillar is lead-coloured, in some specimens smoky black, with numerous black hairs springing from blueish warts; it has three yellow stripes, the broadest down the centre of the back, the others on each side. It feeds chiefly on Hound's-tongue (*Cynoglossum officinale*), and may be found abundantly wherever that plant occurs. An old gravel-pit on the London side of Dartford, and Tintern Abbey, may be mentioned as two favourite and familiar localities for this beautiful Moth. The Moth appears about Midsummer. (The scientific name is *Callimorpha Dominula.*)

FAMILY XI.—THE CHELONIIDÆ.

70. The Clouded Buff (*Euthemonia russula*).
The Wood Tiger (*Chelonia Plantaginis*).
72. The Tiger (*Chelonia caia*).
73. The Cream-spot Tiger (*Chelonia villica*).
74. The Ruby Tiger (*Arctia fuliginosa*).
75. The Muslin Moth (*Arctia mendica*).
76. The Buff Ermine (*Arctia lubricipeda*).
77. The White Ermine (*Arctia Menthastri*).
78. The Water Ermine (*Arctia Urticæ*).

THE ELEVENTH FAMILY of Moths, called *Cheloniidæ*, contains eleven species; they are the true Tiger Moths, so called from the beauty of their variegated colouring. They differ from the *Eucheliidæ*, in the males always having the antennæ fringed. The caterpillars are still more hairy than those of the *Eucheliidæ*, and roll themselves in a ring when disturbed. They spin a loose silken web, in which a great quantity of their hairs are interspersed; the chrysalis is smooth.



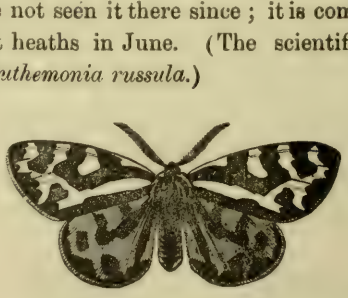
70.—The Clouded Buff (Male) (*Euthemonia russula*).

70. THE CLOUDED BUFF.—The male is very much larger than the female, and so different, that we must describe them separately; Linnæus, indeed, believed them to be two distinct insects; he called the male *Bombyx Sannio*, and the female *Bombyx russula*. The fore wings of the male are buff, with a conspicuous central spot, in which red-brown and dull brown are mixed; there is a brown stripe along the inner margin, and within this is a red-brown stripe; the hind margin is bright red-brown, and a delicate stripe of the same colour runs from the tip of the wing half way along the costal margin; hind wings whitish yellow, with a broad smoke-coloured band near the hind margin, the margin itself being bright red-brown; there is also a large crescent-shaped smoke-coloured mark in the middle, and an indistinct smoke-coloured cloud at the base: head and thorax yellow, and body pale. Fore wings of the female reddish orange-coloured, with the rays and a central spot bright red-brown, and various black markings, and a black cloud about the base: head and thorax deep orange-coloured; body black with slender orange rings. Caterpillar brown,



The Clouded Buff (Female).

with red-brown hairs, and a yellow stripe down the middle of the back; it feeds on Mouse-ear, Hawk-weed (*Hieracium pilosella*), Dandelion (*Leontodon taraxacum*), Heath (*Erica cinerea*), and probably several other plants growing on heaths. The male used to be very abundant on Blackheath, among the furze and fern, twenty years ago, but we have not seen it there since; it is common on most heaths in June. (The scientific name is *Euthemonia russula*.)



71.—The Wood Tiger (Male) (*Chelonia Plantaginis*).

71. THE WOOD TIGER.—Fore wings of the male intense velvety black with cream-coloured markings, of which the most conspicuous are —*first*, a long stripe, parallel with the inner margin; and *secondly*, an irregular and often incomplete figure, somewhat like the letter X, occupying the apex of the wing; this X-like mark and the stripe are often connected together; there are two other cream-coloured markings on the costal margin; hind wings bright orange, with velvety black markings;



The Wood Tiger (Female).

the orange colour occupies the basal part of the wing. Fore wings of the female much like those of the male; hind wings also very similar, but the basal portion of the wing is black. Antennæ black, with a yellow spot at the base in the male; neck black in the middle, bright-orange on the sides; thorax black, with four longitudinal pale markings—one at the base of each wing, the other intermediate between them, and often wanting in the female: body of the male black in the middle and orange at the sides; of the female, black in the middle and crimson on the sides. The caterpillar is of a greyish-black colour; it is covered with warts or tubercles, from which spring a number of long hairs; these are much longest at the hinder extremity of the caterpillar; at both ends of the caterpillars the hairs are black, but red-brown on the middle segments; the caterpillars come out of the egg at the end of summer, and, after feeding for fourteen days, retire for the winter or hybernate until March, when they re-appear, and feed again for seven or eight weeks. In May they spin a slight web between the leaves of various herbs, especially violets, on which, as well as on plantain, and a number of other plants, the caterpillar feeds. The Moth comes out in May or June, and is common in the woods of the south of England, especially after they have been cut down. (The scientific name is *Chelonia Plantaginis*.)



72. The Tiger (*Chelonia caja*). (No. 1.)

72. The Tiger.—Fore wings rich velvety-brown, with cream-coloured markings, so various in their size, shape, and position, that it is impossible to describe them; hind wings red with blue-black spots, three of which are ranged in a row parallel with the hind margin. This grand insect is so variable in colour that we have thought it best to give three figures of it to show the curious manner in which the colours are distributed. Sometimes the brown occupies the whole, not only of the fore wings, but also of the hind wings, as in No. 3; but in other specimens the cream-colour greatly predominates, as in No. 2; the upper figure, No. 1, represents the most common variety. Antennæ white, with a brown fringe: head brown; thorax brown, with a crimson ring round the neck; body crimson with a row of



The Tiger. (No. 2.)



The Tiger. (No. 3.)

oblong black spots down the centre of the back, and a row of black dots on each side generally concealed by the wings. The caterpillar of this beautiful Moth feeds on almost every plant and in almost every garden: the egg is laid in autumn, and the little caterpillar soon makes its appearance, but after feeding for twenty or twenty-two days, and attaining a length of about three-quarters of an inch, it hybernates or retires for the winter. In the spring it re-appears, and begins eating with great voracity: you cannot pass along a sunny hedge-bank without observing it on the various kinds of dead nettle, of which it seems particularly fond; in gardens it is equally abundant on the leaves of hollyhocks, and, indeed, nothing comes amiss to it; it is full-grown in June, and is then a very familiar object to all gardeners, looking like a little bear. The ground-colour is black, and it is covered all over with very long hairs; those on the back are grey, those of the sides and about the head are brown; the head itself and the legs are black. It spins a loose hairy web in July, and turns to a large black, smooth chrysalis. The Moth appears in July. (The scientific name is *Chelonia caja*.)



73. The Cream-spot Tiger (*Chelonia villica*).

73. THE CREAM-SPOT TIGER.—Fore wings black, with eight cream-coloured spots; the first, large and somewhat triangular, is situate at the base of the wing; beyond this are two rounded spots; then two more, rather smaller and more distant; then come two more, larger and nearer together; and lastly, a single one near the tip of the wing. The hind wings are bright orange-yellow, with half-a-dozen scattered small black spots, and an irregular black blotch on the tip. Antennæ and head black; thorax black, with a cream-coloured spot on each side in front; body orange-colour shaded to rosy-red towards the extremity, and having a row of black spots down the middle of the back, and another row on each side, concealed by the wings. The caterpillar is very hairy; the ground-colour black, and the hairs brown; its head and legs are red. We have always found it feeding on chickweed; but continental entomologists mention a number of other herbs on which it feeds. The egg is laid in the autumn, and the little caterpillar, after feeding for a few weeks, lies up for the winter. It begins eating again in April; and on fine days in May may be seen on sunny hedge-banks by the road side wherever chickweed abounds; it spins a web at the end of May, and changes to a blackish chrysalis. The Moth comes out towards the end of June. It is a quiet and lethargic insect, especially the female, which we have never taken on the wing; and the male very rarely. (The scientific name is *Chelonia villica*.)



74. The Ruby Tiger (*Arctia fuliginosa*).

74. THE RUBY TIGER.—Wings semi-transparent; fore wings brown, with two black dots a little above the middle; hind wings with the inner half pink, the outer half smoke-coloured, and having two black dots in the middle; a band of dark smoke-colour runs all along the hind wing near the margin, the margin itself being of a lovely rose-colour; head and thorax brown, with a pink tinge; body pink with a black stripe down the middle, and a row of black dots on each side. Caterpillar somewhat smoke-coloured, each segment having a series of warts or tubercles, all of which emit brown hairs. There are two broods; the first feed early in the spring, having hybernated or passed the winter as caterpillars; in May they spin a loose boat-shaped cocoon, in which they turn to a smooth blackish chrysalis, with paler bands. They may be seen through the silk of the cocoon. The perfect Moth appears in June, and lays eggs before the end of the month; these are soon hatched and begin feeding on dock, plantain, and several grasses, and are full fed the first week in August, and turn to perfect Moths about the end of the month. They lay eggs which hatch in a few days, eat for fourteen to twenty days, and then hybernate in crevices of bark and other secure places. (The scientific name is *Arctia fuliginosa*).



75. The Muslin Moth (Male) (*Arctia mendica*).

75. The Muslin Moth.—Male smoke-coloured all over: female white with the wings semi-transparent; both sexes have the wings spotted with black; the spots are small and usually six or eight in number on each wing; in the female the antennæ are black, and there is a row of black down the middle of the body as well as along each side. The caterpillar has the head and legs very shining and reddish brown; body pale smoky-brown,



The Muslin Moth (Female).

with a still paler line down the very middle of the back; each segment has a series of ten warts, and each wart emits a number of strong bright rust-coloured bristles. The caterpillar is common on chickweed, dock, &c.; it spins a blackish-looking cocoon on the ground in August, and turns to a smooth brown chrysalis, in which state it remains all through the winter, the perfect Moth appearing next June. (The scientific name is *Arctia mendica.*)



76. The Buff Ermine (*Arctia lubricipeda*).

76. The Buff Ermine.—Uniform buff-colour, the male darker than the female; fore wings with two small black spots on the costal margin, and a row of small black spots, forming an oblique line across the wings, from the tip of the wing to the middle of the inner margin; hind wings generally with two or three black spots distant from each other. The caterpillar is of a dingy-white colour, covered with long pale-brown hairs: there is a narrow white line down the middle of its back, and below this on each side a broad smoke coloured stripe. It feeds on docks and may be readily found by turning up the leaves of the dock on hedge banks. It spins a loose cocoon on the ground, and changes to a smooth dark-coloured chrysalis, in which state it remains all through the winter. The Moth appears about Midsummer. (The scientific name is *Arctia lubricipeda.*)



77. The White Ermine (*Arctia Menthastri*).

77. The White Ermine.—Fore wings cream-coloured, with about thirty black spots scattered over them; those near the tip of the wing are longer and narrower than the rest; hind wings whiter than fore wings, having a double black spot in the middle, very much like the sign used by printers to imply seconds; there are generally three other black spots arranged near the hind margin: antennæ black; head and thorax white; body yellow, with a row of black spots down the back, and another on each side. The caterpillar is brown, with long hairs of the same colour, and with a paler line down the middle of the back. It feeds on almost everything, and is common everywhere in August and September. It spins a slight cocoon, in which it changes to a dark-brown chrysalis, in which state it remains during the winter. The Moth appears in June. (The scientific name is *Arctia Menthastri.*)



78. The Water Ermine (*Arctia Urticæ*).

78. The Water Ermine.—Wings white; the fore wings with a black dot near the costal margin, and half way between the base and tip; head and thorax white; body yellow, with the tip snowy white, and having a row of black spots down the middle of the back, and on each side. Caterpillar nearly black, with an indistinct stripe down the back, and very hairy. It feeds on mint, willow herb, and on herbs of different kinds, by the sides of ditches and in wet places, almost invariably concealing itself on the underside of the leaves; it spins a slight web amongst its food, and turns to a smooth dark-coloured chrysalis, in which state it remains throughout the winter, the Moth appearing the following June. (The scientific name is *Arctia Urticæ.*)

FAMILY XII.—THE LIPARIDÆ.

79. The Brown-tail Moth (*Liparis chrysorrhœa*).
80. The Yellow-tail Moth (*Liparis auriflua*).
81. The Satin Moth (*Liparis Salicis*).
82. The Gipsy (*Liparis dispar*).
83. The Black Arches (*Liparis monaca*).
84. The Pale Tussock (*Orgyia pudibunda*).
85. The Dark Tussock (*Orgyia fascelina*).
86. The Reed Tussock (*Orgyia cœnosa*).
87 The Scarce Vapourer (*Orgyia gonostigma*).
88. The Common Vapourer (*Orgyia antiqua*).
89. The Nut-Tree Tussock (*Demas Coryli*).

THE TWELFTH FAMILY of Moths, called *Liparidæ*, contains eleven species: they have far less brilliancy of colour than the *Cheloniidæ* and in several species white greatly predominates. The caterpillars are very hairy, and many have stiff tufts of hair like brushes; but what is the most singular and unmistakable character of the family is, that all the chrysalides as well as the caterpillars are hairy.



79. The Brown-tail Moth (*Liparis chrysorrhœa*).

79. THE BROWN-TAIL MOTH.—All the wings white; head and thorax also white; body white at the base, but brown at the extremity; in the female the brown part is a large tuft, the down on which is most abundant, and is scraped off by the insect as a covering for her eggs. The caterpillar is short, stout, and black, with four rows of wart-like tubercles on each side, from which radiate a number of long bristle-like hairs. These tufts of hair on the second row from the back, on the segments from the fifth to the twelfth both inclusive, are snow-white and fanlike; the tenth and the eleventh segments have a circular, wax-like, cup-shaped, scarlet spot on the very middle of the back; there are also several other small scarlet markings on different parts of the caterpillar. It feeds on whitethorn and blackthorn, and spins a thin web among the leaves, in which it changes into a chrysalis having a few tufts of thin brown hairs. (The scientific name is *Liparis chrysorrhœa*.)

80. THE YELLOW-TAIL MOTH.—All the wings are of a delicate satiny-white, the fore



80. The Yellow-tail Moth (*Liparis auriflua*).

wings having a round and often indistinct black spot near the anal angle; the head and thorax are pure unsullied white; the body is white at the base, but golden-yellow at the extremity. The female Moth has the same habit as the last, covering its eggs with the down from its own body. The caterpillar is short and stout, the ground-colour black; it has rows of tubercles on each side, from each of which radiates a number of bristle-like hairs. The first row of tubercles, that nearest the back, is black; each of the second row is ornamented with a tuft of whitish hairs; the third row of tubercles is coral-red. There are two interrupted vermillion-coloured stripes extending along the back; the second segment has a coral-coloured projection close behind the head; the fifth and sixth segments are humped on the back; the tenth and the eleventh have a round, wax-like, cup-shaped mark on the very middle of the back. It is a beautiful and very common caterpillar, feeding on the whitethorn in every hedge; it spins a web among its food, and changes to a brown chrysalis, having a few scattered tufts of brown hairs. The Moth appears in July. (The scientific name is *Liparis auriflua*.)



81. The Satin Moth (*Liparis Salicis*).

81. THE SATIN MOTH.—Wings white, un-

spotted, delicately silky; head white; the antennæ white, with short black rays; thorax white; body black, but covered with long silky white hairs; legs thick, tinged with white. The caterpillar has a row of most conspicuous white spots all down the middle of the back; on each side of this row is a broad black stripe, in which are eleven red warts or tubercles; the sides are grey, and are also adorned with red tubercles. It feeds chiefly on the Lombardy poplar, but sometimes on other trees: spins a web on the trunks of the poplar, or on the ground, and changes to a very hairy chrysalis, and to a Moth in July and August. This Moth is excessively abundant. (The scientific name is *Liparis Salicis.*)



82. The Gipsy (Male) (*Liparis dispar*).



The Gipsy (Female).

82. The Gipsy.—The wings of the male dark-brown or smoky-black, with several waved zigzag darker markings, and a dark central spot: hind wings of a pale and clearer brown, but rather darker towards the margin; head, thorax, and body dark-brown. All the wings of the female dingy-white, the fore wings having three transverse waved zigzag darker lines; between the first and second there is a black dot, and also a black mark of the shape of the letter V. There is a row of black dots all along the hind margin of both wings. A variety of the female sometimes occurs in which the black V on the wings only is visible—this was mistaken by the late accomplished Mr. Haworth for the Black-V Moth (*Orgyia V-nigrum* of science), a very distinct species, unknown in this country. When we recollect that Mr. Haworth studied and wrote during the long war incident on the first French Revolution, a period when it was almost impossible to interchange books and specimens with continental entomologists, we can only wonder at the great degree of accuracy with which his laborious work was compiled, and must never complain of a few unimportant and most excusable mistakes. The caterpillar of the Gipsy has the ground-colour black, beautifully netted with grey markings, and it has a conspicuous grey line down the very middle of the back: each segment has six tubercles, two on the back, of a deep blood-colour, and two on each side of a greyish hue; the blood-coloured tubercles emit straight black bristles, the grey tubercles emit brown hairs, which are gracefully bent over towards the legs; the head is marbled with black and brown; the legs are red-brown. It feeds on whitethorn, blackthorn, plum, and apple, and in some parts of France so strips the trees of their foliage as to do great injury to the fruit, for fruit will not ripen without leaves. Duponchel has made a very erroneous description of the caterpillar, although so common. I am indebted to Mr. Thomas Huckett, a most industrious collector, for those which I have described. The caterpillar spins a slight web amongst its food, in which it changes to a chrysalis, with a few thin bunches of hair all over it; the eggs continue to hatch during several weeks in succession; the Moth begins to appear about Midsummer, and specimens continue to come out during the whole of July. The female lays her eggs on the branches of trees, and covers them with down from her own body. (The scientific name is *Liparis dispar.*)

83. The Black Arches.—Fore wings white, with five zigzag transverse black lines; the first is near the base, but still nearer the base are six black spots; beyond the first line is one black spot; beyond this are three zigzag



83. The Black Arches (Male) (*Liparis monacha*).



The Black Arches (Female).

lines crowded together; at a short distance follows the fifth line, and on the hind margin of the wing are nine black spots; hind wings of the female smoke-coloured, with a pale marginal band, in which are six or seven dark spots; head white, palpi, antennæ, and eyes black; the antennæ of the male have white shafts; thorax with a black mark in front, close behind the head, and three or four black spots in the middle; body rosy-red with a row of black dots down the middle, and a row on each side; legs black and white in the male —black in the female. The caterpillar is grey and hairy, with a darker stripe down the back; the second segment has two bluish tubercles on the back; the ninth, tenth, and eleventh segments have a reddish tubercle on the back. It feeds on oak, birch, &c.; spins a slight cocoon in July, in the crevices of the bark; and changes to a blackish shining chrysalis, which is ornamented with brushes of dark hair on every segment. The Moth appears in July and August, and is not common. (The scientific name is *Liparis monacha*.)



84. The Pale Tussock (*Orgyia pudibunda*).

84. The Pale Tussock.—Fore wings of the male grey, with a broad central smoke-coloured transverse bar, more or less distinct; this bar includes several darker waved lines; the fringe on the hind margin has seven or eight dark spots; the fore wings of the female are pale-grey, without the central bar, but instead of this they have two transverse, rather waved, lines, one rather before the middle, and the other rather beyond; the fringe is spotted as in the male; hind wings in both male and female nearly white, with a faint greyish central transverse bar, which is most conspicuous towards the anal angle: head, thorax, and body grey; fore legs of the male very hairy. The caterpillar is of a delicate green colour, with a band of the most intense velvety black between the fifth and sixth segments, another between the sixth and seventh, and a third between the seventh and eighth; all these four segments have a thick tuft of yellow hair, like a brush, on the back; the twelfth segment has a longer and more slender tuft, directed backward; it feeds on oak, lime, hazel, edible chestnut, and many other trees. I have had a number of these caterpillars this year, and have observed that before they changed their skins, they spin a little silken house, bending a leaf over their backs. They feed through June, July, and August, spin a slight web among the leaves, and turn to a hairy chrysalis, which turns to a Moth the following May. The beautiful caterpillar is common everywhere: it is called the "Hop-dog"; the Moth not so often seen. (The scientific name is *Orgyia pudibunda*.)

85. The Dark Tussock.—Fore wings smoky-grey, with three transverse dark waved markings; the first of these is near the base, the other two are near together, and beyond the middle of the wing; all are accompanied by orange-coloured sprinkled dots; and there is a dark dotted line along the hind margin,



85. The Dark Tussock (*Orgyia fascelina*).

just within the fringe; hind wings paler smoky-grey, and without markings, except a dark and very narrow line along the hind margin, just within the fringe; head, thorax, and body smoky-grey. Caterpillar very dark smoke-colour, with lemon-coloured hairs; the fifth, sixth, seventh, and eighth segments have dense brushlike tufts of hair ofa dark colour, and there is a longer, more slender tuft on the twelfth segment pointing backwards. It feeds on plum, hazel, and a number of other trees, and sometimes on herbaceous plants. It spins a slight web amongst its food, and turns to a black chrysalis, with numerous little tufts of hair. The Moth appears about Midsummer, and is not common. (The scientific name is *Orgyia fascelina.*)



86. The Reed Tussock (*Orgyia cænosa*).

86. The Reed Tussock.—Fore wings of the male pale-brown, the hind wings still paler; wings of the female almost white—all the wings in both sexes spotless; head, thorax, and body dingy-white, legs yellow. The caterpillar has the ground-colour very dark, almost black, but every segment has a series of tubercles or warts, from which issue yellow bristle-like hairs; the second segment bears two long tufts of black hairs, which project forwards over the head; the fifth, sixth, seventh, and eighth segments have each a thick tuft of yellow hairs, which stick upright like a stiff brush, on the centre of the back, and the last segment has a long, slender tuft of black hairs, which points directly backwards. It feeds on the common reed (*Arundo phragmitis*), and, when full fed, spins an oblong cocoon, rather pointed at both ends, on the leaves or stems of the reed; in this it changes to a hairy chrysalis; the cocoon is thickly interspersed with the hairs of the caterpillar. The Moths begin to appear early in June, and continue coming out through the whole of July and August, during which months the caterpillar also feeds, so that the collectors have frequently taken caterpillars and Moths on the same day. The circumstance arises from the curious fact, that the eggs laid by the female do not hatch simultaneously, but the little caterpillars continue to make their appearance in irregular succession during a period of seven weeks. This Moth is very local, being only found in the Fen country called Whittlesea Mere. (The scientific name is *Orgyia cænosa.*)



Female. Male.

87. The Scarce Vapourer (*Orgyia gonostigma*).

87. The Scarce Vapourer.—Fore wings of the male of a beautiful mottled brown, with several waved transverse darker markings, a curved row of three or four white spots near the tip, a comma-shaped white mark at the anal angle, and an orange-coloured blotch on the costal margin, near the tip; hind wings plain dark-brown: head, thorax, and body, dark-brown. The female has no wings, but is covered all over with velvety-brown down. The caterpillar is bright orange-coloured, with four rows of black spots which almost touch each other, so as to form stripes; the fifth, sixth, seventh, and eighth segments have each a tuft or bunch of brown hairs on the back, the second segment has two long, slender tufts of black hairs, pointing forwards over the head; the twelfth segment

has a single tuft of long black hairs; and the thirteenth segment three such tufts, all pointing backwards. It feeds on nut and oak, spins a web on the stems of the trees, and turns to a hairy chrysalis. The female never leaves the web; the male Moth appears on the wing in July, and is not common. (The scientific name is *Orgyia gonostigma.*)



Male. Female.

88. The Common Vapourer (*Orgyia antiqua*).

88. The Common Vapourer.—All the wings of the male bright chestnut-brown, the fore wings having darker transverse markings, and a white, rather crescent-shaped, mark in the anal angle: head, thorax, and body brown. The female is without wings, but is covered with grey down. The caterpillar is particoloured—brown, grey, and pink; different specimens are of different colours; the fifth, sixth, seventh, and eighth segments have each a tuft or brush of yellowish hairs on the back; the second segment has two long slender black tufts, pointing forwards over the head, and the twelfth segment has one slender tuft pointing backwards. It feeds on every tree or shrub in the garden. It spins a web on walls, trunks of trees, and other exposed places, and, in this, changes to a hairy chrysalis. When the female comes out, she crawls on the web, and never leaves it, laying her eggs all over it. It is a very curious thing, and I believe hitherto unobserved, and therefore unpublished, that these eggs do not hatch all together like those of Moths in general, but come out a few at a time, over a period of ten weeks, so that the caterpillar, chrysalis, and Moths are all found together throughout the summer and autumn. Quartermaster-sergeant M'Laren, of Warley Barracks, a most excellent observer, first called my attention to this interesting fact. The caterpillar is to be seen in abundance in all the squares of London, and the male Moth may be observed also daily dashing about the streets, even in the hottest sunshine. (The scientific name is *Orgyia antiqua.*)



89. The Nut-tree Tussock (*Demas Coryli*).

89. The Nut-tree Tussock.—Fore wings with the outer half grey, the inner half darker grey, and marked with still darker waved transverse lines; at the very base, the wings are slightly paler; in very fine specimens, there is a small dark ring near the middle; hind wings pale-brown, and without markings; thorax grey, with two longitudinal dark lines down the middle, and three transverse dark lines on each side; body grey-brown. The caterpillar is dingy-white, sometimes tinged with rosy-brown; it has a broad dark stripe down the middle of the back, and a tuft or brush of brown hairs on the fourth, fifth, and twelfth segments. I have found it only on the nut and beech, but continental authors describe it as feeding on a number of different trees; it spins a slight web under moss at the roots of trees. The chrysalis is hairy, and may be found under the moss about the roots of beech trees. The Moth appears in June, and is far from common. (The scientific name is *Demas Coryli.*)

FAMILY XIII. BOMBYCIDÆ.

90. The Pale Oak Eggar (*Trichiura Cratægi*).
91. The December Moth (*Pœcilocampa Populi*).
92. The Small Eggar (*Eriogaster lanestris*).
93. The Lackey (*Bombyx neustria*).
94. The Ground Lackey (*Bombyx castrensis*).
95. The Fox Moth (*Bombyx Rubi*).
96. The Oak Eggar (*Bombyx Quercus*).
97. The Grass Eggar (*Bombyx Trifolii*).
98. The Drinker (*Odonestis potatoria*).
99. The Lappet (*Lasiocampa quercifolia*).
100. The Small Lappet (*Lasiocampa ilicifolia*).
101. The Kentish Glory (*Endromis versicolor*).
102. The Emperor Moth (*Saturnia carpini*).

THE THIRTEENTH FAMILY of Moths is called *Bombycidæ*. All the Moths are of considerable size and generally of a brown or grey hue; the caterpillars are mostly hairy, and the chrysalis smooth, that is without hairs, a character that will at once distinguish a chrysalis of this family from one of the foregoing. This family contains thirteen Moths.



90. The Pale Oak Eggar (*Trichiura Cratægi*).

90. THE PALE OAK EGGAR.—Fore wings of the male grey, with an oblique central transverse bar of a darker grey; this central bar is bordered on each side by a waved line still darker and almost black; the innermost of these lines curves round to the base of the wing. In some specimens I have seen, from the North of England, the ground-colour is almost white, and the bar almost black: hind wings grey with a slight darker transverse bar about the middle; head, thorax, and body dark grey, the body ending in two faulike tufts of hairs. Female dark brown-grey with few and very indistinct markings: the end of the body rounded and hairy. The caterpillar is dark-grey, with two red bristly tubercles on each segment, and a row of pale spots along each side. It feeds on whitethorn and blackthorn, and spins a small brown oblong cocoon. The Moth appears in August and September. (The scientific name is *Trichiura Cratægi*.)

91. THE DECEMBER MOTH.—Fore wings smoky-brown, shading to mahogany-colour at the base, and having two conspicuous, waved, oblique, transverse, pale bars; the first of these is very short, and near the base of the wing,



91. The December Moth (*Pœcilocampa Populi*).

forming a boundary line to the mahogany-colour; the second is beyond the middle of the wing, and between the two is a crescent-shaped but rather indistinct spot: hind wings smoke-coloured, with a straight pale bar across the middle of the wing: the antennæ have the shaft brown, the fringe smoke-coloured; the head brown; thorax smoky-brown, with a pale collar in front, body smoky-brown, with long hairs at the end. The caterpillar is very beautiful, and most varied in colour; I have often seen it sunning itself on the trunks of oak-trees, on the leaves of which it feeds: it seems as though it came down out of the tree to display its great beauty to the passer-by, but the more probable cause of this habit is, that its similarity to the diversified colour of the lichens on the trunk may perhaps deceive the sharp eyes of birds, which are ever on the watch for such a dainty dinner; the colours are black, grey, and white, and there is a yellowish stripe along each side, and two reddish tubercles on the second segment; it spins a small, very compact, black, oval cocoon, and in this it changes to a smooth brown chrysalis, which sometimes comes out in the next November or December, but if the weather at this particular time proves unfavourable, it remains in the cocoon one, two, three, four, and even five years. The cocoons may be looked for in various situations and on various trees—ash, poplar, &c. Sometimes they will be found firmly glued to the

inside of a piece of loose bark or to the tree itself; at others, spun up tightly among decayed leaves, dead grass, &c., in August and September. (The scientific name is *Pœcilocampa Populi.*)



92. The Small Eggar (*Eriogaster lanestris*).

92. THE SMALL EGGAR. — Fore wings reddish-brown, paler towards the hind margin, and having a white spot at the base, and another in the centre of the wing; and beyond the central white spot, half way between it and the hind margin of the wing, is a narrow, waved, transverse, white line: hind wings pale red-brown with a straight, pale, indistinct bar across the middle of the wing; antennæ with the shaft brown, the fringe pale-brown; head and thorax red-brown; body red-brown at the base, smoky-brown and very hairy at the end; in the female, furnished with a great quantity of silky hair, with which she covers her eggs. The caterpillar is gregarious, feeding in company, and when young, spinning a web over the hawthorn, on which it commonly feeds, but sometimes also on elm. It is slightly hairy, and almost black, with three white spots and two red warts on the back of each segment; there is also a pale-grey stripe along each side. It spins a small, oval, very compact cocoon at the end of June, and the Moth appears the following February. (The scientific name is *Eriogaster lanestris.*)



93. The Lackey (*Bombyx neustria*).

93. THE LACKEY.—Fore wings bright red-brown or yellow, with two pale, oblique, transverse bars, the first rather before the middle, the second rather beyond the middle; in the yellow specimens these bars are dark-brown; the fringe at the hind margin is alternately pale and dark; hind wings red-brown, generally slightly paler than the fore wings, with a very indistinct straight bar across the middle; head, thorax, and body, bright red-brown. A very variable insect, scarcely two specimens being exactly alike. The caterpillar is long, slender, and flaccid; it has no power to roll itself in a ring; in its early life it is gregarious, spinning the web over the leaves and twigs of the apple-trees, and giving them a completely unhealthy and blighted, if not disgusting appearance; on this web the half-grown caterpillars may sometimes be observed sunning themselves by dozens. The head is blue-grey, with two spots looking like eyes; the second segment is blue-grey, with four black spots; all the other segments are striped throughout; there is a central white stripe down the very middle of the back; on each side of this is a slender black line, then an orange-red stripe, then a black stripe, spotted with blue, then a narrow and interrupted orange stripe, then a broad blue stripe, then an orange stripe. dotted on each side with black, and below this, near the legs, the caterpillar is blue-grey, dotted with black; it spins an oblong sulphur-coloured cocoon, in which a sulphur-coloured powder is abundantly intermixed. In this it changes to a smooth brown chrysalis, from whence the Moth emerges in July. The female lays her eggs in the neatest possible ring round the twigs of the apple-trees. (The scientific name is *Bombyx neustria.*)



94. The Ground Lackey (Male) (*Bombyx castrensis*).

94. THE GROUND LACKEY.—Fore wings of the male dull red-brown or yellow, with two transverse bars; the first, before the middle of the wing, turns inwards towards its base be-

fore it reaches the inner margin ; the second, situated beyond the middle of the wing, turns outward towards its anal angle: hind wings darker than the fore wings. The female is dull red-brown, with two pale transverse bars on the fore wings : head, thorax, and body, dull red-brown. A very variable insect, and therefore very difficult to describe. The caterpillar is long, and slightly hairy, it cannot roll itself in a ring when touched ; the back is black, and the sides blue-grey ; the black on the back is a broad stripe of equal



The Ground Lackey (Female).

width from one end of the caterpillar to the other, and is transversed throughout its length by four longitudinal interrupted orange streaks ; the blue-grey of the sides has an orange stripe in the middle, and is also dotted throughout with minute black points ; the hairs of the caterpillar are orange brown. It feeds on the sea-wormwood, the wild carrot, and some other plants, and spins a sulphur-coloured cocoon among the leaves, in which it turns to a black chrysalis. The caterpillar is found in May ; the Moth appears in August. Very abundant in the Isle of Sheppey, but not met with elsewhere ; I am indebted to Mr. Ingall not only for caterpillars, chrysalises, and Moths, but also for all I know of this interesting Moth. I found that in confinement the caterpillar would eat the leaves of apple, pear, rose, poplar, and birch, if sprinkled with salt and water. (The scientific name is *Bombyx castrensis.*)

95. The Fox Moth.—Male reddish-brown, female dingy-brown, the fore wings in both sexes having two pale transverse bars, one exactly in the middle, the other nearer the base : the head, thorax, and body, are uniform brown. The caterpillar is of a rich velvety, golden, orange-brown colour on the back, with a number of long silky-brown hairs



95. The Fox Moth (*Bombyx Rubi*).

along the middle ; the sides are entirely black : it rolls in a ring when touched, and then shows spaces between the segments of the most intense velvety black. It feeds on bramble and on heath, amongst which it spins a very long and loose dark-brown cocoon, in which the hairs of the caterpillar are abundantly intermixed. I have one of these cocoons four inches long ; in this cocoon it changes to a large and smooth dark-brown chrysalis. The caterpillar is abundant in August and September, the Moth in June. (The scientific name is *Bombyx Rubi.*)



96. The Oak Eggar (Male) (*Bombyx Quercus*).

96. The Oak Eggar.—Male deep mahogany-brown, all four wings having beyond the middle a broad transverse bar of bright fulvous ; the margin of the bar nearest the body is clear and well defined ; its outer margin shades off gradually into the dark brown ; between this bar and the base of the wing is a pure white spot : head, thorax, and body mahogany-brown above, fulvous beneath : the female is larger than the male, and the colour fulvous, the bar being indistinct and narrow. The caterpillar feeds on a number of plants and shrubs, particularly whitethorn ; when young it is brown, with bright yellow markings along the middle of its back ; when full-

grown it is very large, and rolls in a ring when touched: its ground colour is velvety black but densely covered with short down of an amber-brown colour, interspersed with longer



The Oak Eggar (Female).

hairs, so that the black scarcely shows itself, except when the caterpillar rolls itself up, and then a black ring becomes visible between each two segments; two thin tufts of longer and paler hairs spring from the sides of each segment, and point outwards: on each side of the third and fourth segments is a crescent-shaped white mark; a row of dotted white markings forms an interrupted white line along each side; the spiracles are also white, and there is a row of white marks down the very middle of the back, one on the hind part of each of the velvety black bands, which is shown when the animal is rolled up or crawling. It spins a very compact brown cocoon, and in this changes to a dark brown chrysalis. The Moth appears in July. (The scientific name is *Bombyx Quercus.*) In many parts of England and Scotland the caterpillar remains in that state throughout one winter, and in the chrysalis state throughout a second winter; the Moth appearing in May or June. (The scientific name of this variety is *Bombyx Callunæ.*)



97. The Grass Eggar (*Bombyx Trifolii*).

97. The Grass Eggar.—Dingy red-brown, the male rather deeper colour than the female; there is a narrow oblique pale bar across the fore wing, rather beyond the middle, and a second very obscure bar commences on the costal margin very near the base of the wing; nearly midway between the two bars is a distinct white spot: head, thorax, and body red-brown above and below. The caterpillar is black, and covered with velvety pile, which is bright orange-colour down the centre of the back and greyish on the sides; there is a pure black velvety transverse stripe behind the head, and an indistinct grey stripe on each side; there is also sometimes a small orange spot on each side of the third and fourth segments; the velvety pile is interspersed with longer hairs of a grey colour; the head is black with a central longitudinal whitish line: this caterpillar feeds on trefoil and clover, and spins a very small compact brown cocoon among its food; in this it changes to a smooth brown chrysalis. The caterpillar is found in autumn

and again in spring, living through the winter. The Moth appears in August. (The scientific name is *Bombyx Trifolii.*)



98. The Drinker (*Odonestis potatoria*).

98. THE DRINKER.—Male beautifully variegated with brown and fulvous; near the centre of the fore wing is a small white spot, and between this and the costal margin a still smaller one; the bar and middle of the wing are fulvous, the costal margin and hind margin brown with a purple gloss; there is a single oblique line across the wing from the very tip to the middle of the hind margin; the hind wings are brown and without markings. All the wings of the female are pale fulvous-yellow; the fore wings have two white spots as in the male, and an oblique narrow brown line from the tip to the middle of the inner margin; and sometimes, but not always, there is a straight narrow brown line across the base of the wing: the hind wings have a broad indistinct brown band across the middle. The caterpillar is hairy, and rolls in a ring when touched; it may often be observed putting its mouth to a drop of dew and sucking up the whole of it, whence the name of "drinker": in colour it is beautifully and delicately variegated; the back is blue-grey, minutely mottled and dotted with black; on each side is a row of orange-coloured spots, and below the row are oblique orange streaks alternating with short tufts of white hairs. It feeds on different grasses in spring and autumn, and lays up without food during the winter; in May it spins a yellow shuttle-shaped leathery cocoon, pointed at both ends and fixed to the upright flowing stems of grasses; and the Moth comes out in July, and is common everywhere. (The scientific name is *Odonestis potatoria.*)



99. The Lappet (*Lasiocampa quercifolia*).

99. THE LAPPET.—Rich mahogany-brown, with a purple lustre like the bloom on a plum. This beautiful appearance only lasts while the insect is recently out of the chrysalis; it soon fades after the insect has flown. The fore wings have a black dot in the middle, and three zig-zag black transverse lines. One of them is nearer the base of the wing than the central dot, and the other two are beyond it; the hind margin of all the wings is regularly scalloped: the head, thorax, and body, are rich red-brown: there is no difference in the markings of the male and female. The caterpillar is very large, rather hairy, and individual specimens are extremely different from each other, sometimes almost grey with a series of black V-shaped marks all down the back, sometimes plain brown with a paler stripe on each side; there is a row of fleshy tubercles along each side; those



The Lappet.

on the second, third, and fourth segments, are larger and longer than the rest; and there is a conspicuous hump on the twelfth segment; between the second and third segments, and also between the third and fourth, there is a broad transverse stripe of exquisitely-beautiful purple. It feeds on the blackthorn and willow, and spins a long coarse blackish cocoon among the lower twigs, and often amongst grass close to the ground: in this it changes to a black smooth chrysalis. The Moth appears in June. (The scientific name is *Lasiocampa quercifolia.*)



100. The Small Lappet (*Lasiocampa ilicifolia*).

100. THE SMALL LAPPET.—Fore wings reddish-brown at the base, grey towards the hind margin; in the middle of the wing is also a grey space, and in this is a dark spot; on each side of this grey space is a transverse dark dotted line; hind wings smoky-grey with a central broad transverse bar, and also the base, of a delicate pale pearly-grey; the hind margin of all the wings is regularly scalloped, and the hind wings, when the Moth is at rest, project in front of the fore wings; the head, thorax, and body, are grey-brown. Although this insect appears to be common in some parts of England, feeding on the leaves of the whortleberry, I have never yet had the opportunity of seeing it, and therefore copy Hubner's description, as translated in Mr. Stainton's "Manual." I ought, however, to premise that this description closely corresponds with that of *Lasiocampa betulifolia,* as described in Berge's "Butterfly Book." "Caterpillar grey with reddish hairs; a broad, black, dorsal line, interrupted on each segment by a reddish spot and a white stripe on each side of it; a broad, bluish lateral stripe."—"Manual," vol. i., p. 158. The Moth appears in April and May. (The scientific name is *Lasiocampa ilicifolia.*)



101 The Kentish Glory (Male) (*Endromis versicolor*).

101. The Kentish Glory.—Fore wings of the male brown ; hind wings orange-colour : all the wings of the female alike, pale smoky-brown and almost transparent : both male and female are adorned with various marks ; the first is a white spot at the base of the fore wings ; then comes a narrow white bar across the wing, and outside this is a narrow black bar ; beyond this is a V-shaped mark near the middle of the wing ; and beyond this is an angulated narrow black bar ; and this is bordered by a narrow white bar of exactly the same shape ; almost at the tip of the wing are three semicircular white marks in a row ; the hind wings have an angulated narrow black bar across the middle ; the front of the thorax is almost white, the remainder of the thorax brown : the body of the male orange-brown, of the female greyish. In April, the female lays her eggs on the slender twigs of the birch tree, and the caterpillars come out about the first of May. At first they are gregarious, spinning a web over the twig and attaching themselves by their claspers, and holding their heads straight up in the air ; when just hatched they are smoke-coloured, with a darker line down the back, and a dark oblique mark on each segment : there are pimples or warts all over the body, each emitting five or six black hairs ; the lip in front of the head is yellow, and there are two yellow crescent-shaped marks immediately behind the head . the legs are reddish-yellow. After changing its skin the first time, and eating its cast-off coat, an operation which it invariably performs, the caterpillar becomes of a dull pale-green colour, covered with minute black points, and having a conspicuous narrow dark line down the middle of its back ; on each side is a series of paler green diagonal lines : the head is yellowish, with two pairs of longitudinal blackish stripes and a black spot between them ; the claspers are yellow. After the second change the caterpillar becomes



The Kentish Glory (Female).

bright apple-green colour, still powdered with innumerable minute black points on the sides and claspers : the back is whiter green, with a narrow dark line down the very middle ; there is a pale oblique stripe on each segment, bordered with darker green ; the second, third, and fourth segments have a whitish line on each side ; the head has two blackish longitudinal lines on each side. The third change produces little difference in colour. When full grown, and after it has changed its skin four times, the caterpillar is an inch and a half long, and very stout, its colour green, paler and whiter on the back, darker and richer on the sides and belly, where it is also thickly sprinkled with minute circular black dots : the spiracles are white, with a black edge ; the head pale green, with four white longitudinal stripes, the outer ones broadest ; a narrow dark-green line runs down the very centre of the back : on each side of each segment is an oblique white stripe, bordered on each side with darker green ; all these white stripes commence near the straight green line on the back, and each is continued faintly on the segment next to that which it adorns : on each

side of each of the three segments nearest the head, is another short, raised, white stripe: the twelfth segment has a hump on the back ending in a short, blunt, white horn, which has a delicate white line behind; from this horn descends a short white stripe, and below the spiracle on the same segment is another white stripe, bordered above with black. This caterpillar feeds only on the birch throughout May and June; it then descends the tree, and spins a loose dark-brown cocoon among fallen leaves on the surface of the earth, and then changes to a dark-brown chrysalis, which is covered with a delicate bloom. The Moth appears the following March and April, the males flying very swiftly in the middle of the day, the females sitting quietly on the twigs of the birch. (The scientific name is *Endromis versicolor.*)



102. The Emperor Moth (Male) (*Saturnia carpini*).

102. The Emperor Moth.—Brown bloom. Fore wings of the male beautifully variegated with shades of brown, red, and grey; hind wings deep orange, also variegated with brown; all the wings of the female pearly-grey, variegated as in the male. In both sexes all the wings are adorned with a large and beautiful eye-like mark in the centre. This eye has an ample black centre, surrounded with a narrow buff-coloured ring; that portion of this buff-coloured ring which is nearest the base of the wing is bordered with crimson, and the crimson with a delicately violet-coloured crescent, the whole eye being set in a black frame or ring. This beautiful Moth has many other ornamental markings: but those now described are quite sufficient to distinguish it from any other Moth found in Great Britain. The caterpillar is of the most delicate green colour the segments being very distinct, and each being adorned with pink tubercles, each surrounded by a black ring, and emitting a few short black bristles. It feeds in August and September, on willow, blackthorn, heath, and a number of other plants, and before winter spins a brown pearl-shaped cocoon, open at one end, amongst its food. The Moth appears in April. (The scientific name is *Saturnia carpini.*)



The Emperor Moth (Female).

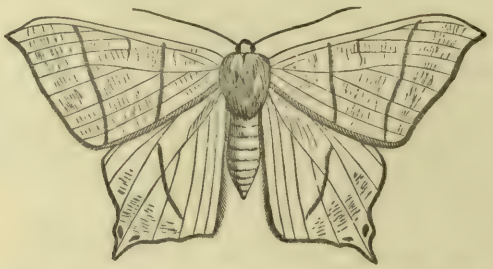
GEOMETERS.

FAMILY I.—URAPTERYDÆ.

Another Great Division or Tribe of Moths are called Geometers (in science, *Geometræ*), from the peculiar attitude which the caterpillars assume in walking. As a general rule the caterpillars of butterflies and moths, like the insects when they have arrived in the perfect or winged state, have six legs; but they also have, on the under-side or belly, a number of circular disks fringed all round with delicate hooks, by which they adhere to the twigs or leaves of the plants they feed upon. These adhering disks have been called "prolegs," "abdominal legs," or "false legs;" but the proper name is "claspers," because they clasp the substance on which the caterpillar is feeding, and this so tightly, sometimes, that the caterpillar cannot be forced away without injury. The caterpillars of butterflies, as well as those of the Moths I have been describing, have almost invariably ten of these claspers, but the Geometers have only four; and these are quite at the tail-end, so that the middle part of the body of the caterpillar has no means of taking hold: when, therefore, the caterpillar walks, it first takes hold of the twig with its six proper legs, and holding tightly, lifts up its claspers, and bringing the two ends of its body almost together, again takes hold with the claspers, the back of the creature making an arch or loop; this position, as I proceed, will be made much more clear by the accurate representations now being prepared, than by any description that I can write. Geometers thus being produced from caterpillars which are smooth and not hairy, and which have but four claspers instead of ten, it is very easy to recognize them in that state; but as we usually meet with them in the perfect or winged state, we very naturally wish for characters by which to recognize them in *that* state also; this, however, is more difficult. Still, I will do my best to explain the principal and general distinctions, requesting my reader to bear constantly in mind that the rules in Natural History, like all other rules, are subject to exceptions. Geometers, then, as a rule, have slender bodies and ample wings; the thorax is covered with long scales or hairs, but is never crested. All Moths have what may be called a pattern on their wings: now this pattern, in the *Nocturni*, is generally extremely different in the fore and hind wings. The principal exception to this rule is the family of Emperor Moths; the Geometers, on the contrary, have not unfrequently the same pattern, or the same distribution of colours, on both pairs of wings. And here I ought to mention that the wing has a bristle on its costal margin, which fits into a sheath on the hind margin of the fore wing; and a fore wing and a hind wing are thus linked together when the insect flies. The bodies of the *Nocturni* are often striped or spotted with red or yellow, more rarely with blue; the bodies of the Geometers are never so adorned. The thorax in Geometers is short and rather square; the hind legs are furnished with four spines.

Until the publication of Mr. Doubleday's synonymic list, no attempt had been made to arrange the Geometers of this country in a natural manner. The collector of these beautiful Moths was, therefore, without a guide, and arranged them either by his own fancy, or by their size, or their colour, or,

perhaps, placed them alphabetically according to names, which in three instances out of four were misplaced; or, perhaps, still worse than all, he followed some printed list, the author of which possessed even less knowledge of the subject than the collector who sought assistance from its pages. The era of ignorance has happily passed away: the Geometers have been most careful studied by Messrs. Guenée and Doubleday, their natural affinities made out, and their numerous species divided into seventeen families, all of them clearly defined and tolerably easy to distinguish. The first of these families is the *Uropterygidæ* or Swallow-tails, and contains only one British species.



103. The Swallow-Tailed Moth (*Uropteryx sambucata*).

103. The Swallow-Tailed Moth.—All the wings of a pale delicate sulphur-yellow; the fore wings have two slender transverse olive-coloured streaks, both of which commence on the costal margin: the first at one-third of the distance between the base and the tip, the second at two-thirds; besides these there are numerous other very slender short transverse streaks, all of them very indistinct and inconspicuous: the hind wings have a single obliquely-transverse streak, extending from the costal margin to the anal angle; about the middle of the hind margin is a short tail, having a distinct but rather small dark spot on each side at the base; the fringe of the hind wings is ochreous, the head is brown, the eyes black; the thorax and body are of the same sulphur-colour as the wings. The caterpillar exactly resembles a twig; it has a hump on the fourth segment, and one on each side of the seventh, ninth and twelfth segments, and two points on the last segment; it is extremely variable in colour yellow-brown, red-brown, and olive-brown being the prevailing tints: and whatever the colour, there are invariably pale stripes along the sides: it feeds on honeysuckle, elder, several fruit trees, and on many herbaceous plants, particularly Forget-me-not; it is most commonly met with in October, and hybernates, or lays up for the winter, in crevices of the bark of trees; it is found feeding again in May, and in June constructs a hammock of silk and fragments of leaves; this it suspends from the underside of a twig, by a few silken cords, and within this hammock it changes to a light brown chrysalis, spotted with black. It remains four weeks in the chrysalis state, and about the 10th of July comes out a perfect Moth. It is very common in the south of England, and may be seen of an evening flying about our hedges and gardens; from its large size and pale colour, it is very easily seen and captured. (The scientific name is *Uropteryx sambucata.)*

FAMILY II.—ENNOMIDÆ.

104. The Dark-bordered Beauty (*Epione vespertaria*).
105. The Bordered Beauty (*Epione apiciaria*).
106. The Little Thorn (*Epione advenaria*).
107. The Brimstone Moth (*Rumia cratægata*).
108. The Speckled Yellow (*Venilia maculata*).
109. The Orange Moth (*Angerona prunaria*).
110. Light Emerald (*Metrocampa margaritaria*).
111. The Barred Red (*Ellopia fasciaria*).
112. The Scorched Wing (*Eurymene dolobraria*).
113. The Lilac Beauty (*Pericallia syringaria*).
114. The Early Thorn (*Selenia illunaria*).
115. The Lunar Thorn (*Selenia lunaria*).
116. The Purple Thorn (*Selenia illustraria*).
117. The Scalloped Hazel (*Odontopera bidentata*).
118. The Scalloped Oak (*Crocallis elinguaria*).
119. The Large Thorn (*Ennomos alniaria*).
120. The Canary-shouldered Thorn (*Ennomos tiliaria*).
121. The Dusky Thorn (*Ennomos fuscantaria*).
122. The September Thorn (*Ennomos erosaria*).
123. The August Thorn (*Ennomos angularia*).
124. The Feathered Thorn (*Himera pennaria*).

The Second Family of Geometers, called Ennomidæ, or Thorns, contains twenty-one British species.



Male.



Female.

104. The Dark-bordered Beauty (*Epione vespertaria*).

104. The Dark-bordered Beauty.—Wings of the male orange, with a very broad hind border of purple-brown; on the fore wings is a curved transverse line half way between the base of the wing and the marginal border; and there is a central dot half way between the curved line and the border. Besides these markings the orange colour is everywhere sprinkled with the same purple-brown as the border. The wings of the female are yellow, the border almost of the same colour as the rest of the wing, but separated from that by a dark transverse line; the head, thorax and body are yellow-orange. Caterpillar brown, with a large pale spot on the sixth segment, and a yellowish spot on each of the five succeeding segments. There is a slender white line on each side, commencing at the end and extending to the sixth segment: it feeds on hazel. The caterpillar is found in August, and the moth in the following June It occurs in Yorkshire and Hampshire, but is not considered a common insect. (The scientific name is *Epione vespertaria.*)



105. The Bordered Beauty (*Epione apiciaria*).

105. The Bordered Beauty.—All the wings bright orange, with a broad purple-brown hind border, which comes to a sharp point at the apex of the fore wings. There is also an angled dark transverse line very near the base of the fore wings, and a central dot half way between this and the outer border; head, thorax and body yellow-orange. Caterpillar whitey-brown, with a paler mark on the sixth segment, and a slender white line on each side. It feeds on willow, hazel and poplar. The caterpillar is found in September, and again in May, perhaps living through the winter. The moth appears in July, and is not uncommon in the south of England. (The scientific name is *Epione apiciaria.*)



106. The Little Thorn (*Epione advenaria.*)

106. The Little Thorn.—All the wings dingy-white, freckled with olive-brown; there

is a rather darker transverse band across the middle of the fore wings, and this is bordered on each side by a still darker line; the hind wings have a central transverse-angled darker line, and within this a central dark dot: head, thorax and body olive-brown. The caterpillar is whitish-grey, with several still whiter markings on the back; two of these are on the sixth segment and one each on the seventh, eighth, ninth and tenth. It feeds on the bilberry. I have never found the caterpillar, but the moth is very abundant every year in Birchwood, Kent, at the beginning of July; it seems, however, to be a rare species. It is a delicate insect and very difficult to obtain in perfect condition. (The scientific name is *Epione advenaria.*)



107. The Brimstone Moth (*Rumia cratægata*).

107. The Brimstone Moth.—All the wings bright canary-yellow; the costal margin of the fore wings is adorned with several conspicuous red-brown spots, one is situated just about the middle, and has a whitish centre, and the largest is at the tip of the wing; the head, thorax and body are canary-yellow. The caterpillar has eight claspers instead of four, but the first an second pairs seem of little or no use when the creature is walking; it has three humps on the back, one on the seventh and two on the ninth segments. It feeds on white-thorn and black-thorn, and spins a thick silken cocoon, generally near or on the ground. The caterpillar and moth are found throughout the summer, and are common everywhere; it is asserted that there are three broods in the year, but I have never proved the assertion. (The scientific name is *Rumia cratægata.*)

108. The Speckled Yellow.—All the wings deep orange-yellow, with a number of purple-brown blotches, the position and

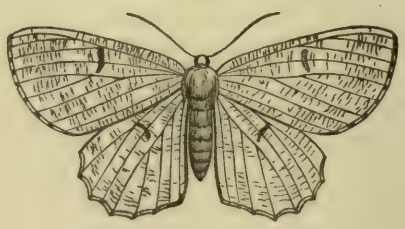


108. The Speckled Yellow — Two Varieties (*Venilia maculata*).

size of which are very correctly shown in the figure, but are very difficult to describe. There is a beautiful and extremely rare variety, which is pure yellow, with four dark spots on the costal margin. (See the lower figure.) The caterpillar is pale olive-green, with a darker green line down the very middle of the back, bordered on each side with white; there is also a whitish line along each side touching the spiracles. It feeds on a variety of herbaceous plants, almost invariably in woods. The caterpillar is found in August and September, the moth in June. (The scientific name is *Venilia maculata.*)



Male.



Female.

109. The Orange Moth (*Angerona prunaria*).

109. The Orange Moth.—The wings of the male generally rich orange, those of the female yellow; in both sexes there is a short central transverse streak near the middle of

the wing, and innumerable minute transverse streaks of brown over the entire surface of all the wings. It is, however, a most variable insect, the wings sometimes being of a uniform plain brown, the fore wings only having a large central orange blotch: when the wings are orange, the head, thorax and body are of the same colour; when the wings are brown, the head, thorax and body are brown also. The caterpillar is grey-brown or yellow-brown: sometimes red-brown specimens occur, marbled with darker markings. It has a double lump on the fifth segment, and another with much more acute points on the ninth. It feeds on blackthorn, beech, and sometimes on broom. At the beginning of May it spins a slight web between two leaves of its food-plant, and in it changes to a reddish-brown chrysalis, from which the moth emerges in about twenty-four days. (The scientific name is *Angerona prunaria.*)



110. Light Emerald (*Metrocampa margaritaria*).

110. Light Emerald.—All the wings are pale green, with an oblique transverse white stripe crossing both wings from near the tip of the fore wing to the anal angle of the hind wing; the inside of this stripe is margined with darker green; on the fore wing there is a less conspicuous transverse white stripe, exactly intermediate between that already described and the base of the wing. The head, thorax and body are pale green, but the eyes intensely black. The caterpillar has six claspers instead of four, and it holds firmly with all of them. It is of a dull olive-green colour, with a darker line down the middle of the back, margined on both sides with a series of whitish marks. I have often found the caterpillar feeding on broom, but the Germans give elm, hornbeam, birch and oak as its food-plants; it is probably a general feeder. The caterpillar is found in September and again in May, living through the winter; the moth appears in July, and is not uncommon. (The scientific name is *Metrocampa margaritaria.*)



111. The Barred Red (*Ellopia fasciaria*).

111. The Barred Red.—Wings rounded, pale brick-dust red; the fore wings have two transverse oblique lines, both of them bent before they reach the costal margin; these lines are of clearer, brighter red than the rest of the wing, and are each accompanied by a paler and almost white line; that accompanying the inner red line is on its inner side; that accompanying the outer red line is on its outer side: hind wings with one central transverse line bordered outside with white: eyes black; head, thorax and body of the same pale red as the wings. Caterpillar reddish brown with a pale-grey line down the back: it has six claspers: it feeds on the Scotch fir in September and October, and, descending the trunk, changes to a chrysalis amongst the fallen needles about the root of the tree on which it has fed. The moth flies about Midsummer. (The scientific name is *Ellopia fasciaria.*)



112. The Scorched Wing (*Eurymene dolobraria*).

112. The Scorched Wing.—Fore wings slightly angled, pale delicate brown, transversely barred with a number of very slender lines, of a dark umber-brown; near the base of the wing are eight or ten perfectly black dots; the costal margin near the base is dark umber; and beyond the middle of the wing is an oblique indistinct band of the

same colour, darker at the inner margin; hind wings rather paler than the fore wings, and having two short curved bands at the anal angle: head and front of thorax dark umber-brown; hind part of thorax and body paler. The caterpillar is pale brown with a still paler line on each side; on the ninth segment is a large lump or wart; the head is notched in the middle. It feeds on beech and oak: changes to a chrysalis in October, under the moss on the trunks of the trees on which it has fed, entering the moss at the most convenient place on the edge of the patch, which should be peeled off carefully with the hand: the moth appears on the wing in June. (The scientific name is *Eurymene dolobraria.*)

I now begin the Thorn Moths as they are commonly called: they are all beautiful and interesting, and I strongly recommend them to the notice of my young friends: all of you I dare say know the song "Fly away, Pretty Moth," it contains a recommendation to all Moths to fly away from candles or lamps, and to take care of their wings lest they get burnt. Now this recommendation is especially needed by the Thorn Moths, for all through the summer and autumn they delight to come to lights of all kinds, and especially to gas-lamps: well for them the flame of gas is protected by glass, so that it is very difficult for them to get at it, or most assuredly they would be perpetually scorching their wings, if not actually committing suicide by burning themselves to death. There is no better or easier mode of finding these beautiful Thorn Moths than looking at the panes of glass with which gas-lights are almost invariably enclosed: the moths will be found settled quietly on the glass as if waiting to be captured.



113. The Lilac Beauty (*Pericallia syringaria*).

113. The Lilac Beauty.—Fore wings slightly angled, the extreme tip very sharp-pointed; ground colour of all the wings a delicate pearly-grey, tinged and clouded here and there with red and yellow; the principal yellow patch is on the fore wings just below the tip, and extending to the hind margin; on each of the fore wings there is also a crescent-shaped white mark just within the tip; and parallel with the hind margin there are two indistinct white markings on the costa; and there is one very conspicuous oblique red-brown line crossing both wings, but on the fore wings suddenly bent before it reaches the costa; parallel with this is a short but distinct line of the same colour about the middle of each fore wing; head, thorax and body pale brown. It is difficult by words to give anything like a correct idea of this beautiful moth; and I am sorry to say that no uncoloured figure will give any notion of the exquisitely diversified tints of its colour. The caterpillar is about an inch and a half long and rather stout behind, but more slender towards the head; it has two warts on the sixth and two others on the seventh segment; and on the ninth segment are two long recurved processes, which Berge calls hooks; they are of an orange-brown colour; the rest of the caterpillar being greyish-brown until the last change of skin, when the hooked lumps become yellower, and all the other parts pearly-grey or rose-coloured; on the back is a paler line, nearly white towards the head, but getting darker behind. and also a number of small white warts or pustules. It is found in June, feeding on elder, privet and lilac; it spins a slight web on the underside of the leaves, and therein changes to a smooth and singularly marked chrysalis, being striped and spotted with brown. In three weeks the moth is on the wing; she lays eggs in a few days. and these are generally hatched the same year, and hybernate or remain in the caterpillar state throughout the winter. (The scientific name is *Pericallia syringaria.*)

114. The Early Thorn.—All the wings are angulated, and pale brown, sprinkled with very small darker dots: the fore wings have three narrow transverse darker lines; there is



114. The Early Thorn (*Selenia illunaria*).

also a very obscure halfmoon-shaped darker mark at the very tip; the hind wings are of the same colour as the fore wings, and are sprinkled in the same manner; and across the middle they have a very indistinct paler band: the head, thorax and body are of exactly the same colour as the wings. The caterpillar is brown, variously mottled and clouded, the eighth and ninth segments are rather swollen; on the back there are two rather pale streaks along each side, the upper one almost on the back; it feeds on willow principally, but when in gardens where it is common, on twenty different plants. It is double-brooded, the first brood appearing on the wing about the 1st of April, the second about the 1st of July; and these two broods are so exceedingly different in appearance that almost all authors have regarded them as two distinct species; calling the spring brood by the name of the Early Thorn, and in science *Selenia illunaria;* and the July brood by the name of the July Thorn, and in science *Selenia Juliaria.* Mr. Haworth, the author of that excellent work "Lepidoptera Britannica," unfortunately written in Latin, considered them distinct; but Mr. Doubleday has proved the contrary, and all entomologists accept his decision. (The scientific name is *Selenia illunaria.*)



115. The Lunar Thorn (*Selenia lunaria*).

115. The Lunar Thorn.—All the wings with sharp angles; pale wainscoat colour: fore wings with a dark brown half-moon-shaped mark at the very tip; across the middle of the wings is a straight line, and the portion of the wing between this line and the hind margin is paler than the portion between the line and the base; just within this line near the middle of the wing is a white crescent-shaped mark; and nearer to the base of the wing is a very distinct narrow transverse waved line; hind wings coloured very much like the fore wings, and having a rather obscure dark band across the middle; in the middle of this band is a crescent-shaped whitish mark surrounded by a dark-brown line: head, thorax and body pale brown. The caterpillar is pale brown, but by no means constant in colour, and has humps on the third, sixth and ninth segments: it feeds on blackthorn, and is to be found in August, the moth in May and beginning of June. (The scientific name is *Selenia lunaria.*)



116. The Purple Thorn (*Selenia illustraria*).

116. The Purple Thorn.—Wings angled; all wings with the basal half rich purple-brown; the marginal a half pearly grey with a delicate rosy tinge: the fore wings have a pure white crescent-shaped spot just within the boundary of the darker half, and a large purple-brown halfmoon-shaped mark at the very tip of the wing: the hind wings have also a slender white crescent in the dark portion: head, thorax and body brown, thorax of the male very hairy. The caterpillar is a rich vinous-brown colour, with a lighter head; there is a bifid hump on the fifth, sixth, eighth and ninth segments; it feeds on birch and oak. When about to change, it spins a slight cocoon among leaves near or on the surface of the ground. This beautiful Moth is double-brooded, the first appearing in May, the second in August: they differ in colour; the late Mr. Stevens described the latter under the scientific name of *Odontoptera delunaria.* (The scientific name is *Selenia illustraria.*)



117. The Scalloped Hazel (*Odontopera bidentata*).

117. The Scalloped Hazel.—All the wings scalloped at the margin dingy whitey-brown; on the fore wings, which are angled as well as scalloped, are two transverse dark-brown lines, the first near the base of the wing, and nearly straight, the second half way between the fore and the hind margin, and very oblique; both these lines are scalloped, and between them, equally distant from both, is a small oblong dark ring; hind wings rather paler than the fore wings, with a single dark line across the middle, and within this, that is, nearer the base of the wing, is a small dark ring; head, thorax and body pale brown. The caterpillar of this moth, unlike its near relations, has eight claspers instead of four, but the first and second pairs seem of very little service in walking, very seldom coming in contact with the leaf or twig on which the creature is crawling; it is rather more slender before than behind, but has no humps on any of its segments; it is very various in colour, grey, grey-green, oil-green, or brown, with a row of lozenge-shaped markings down the back. It changes to a chrysalis in September, and in this state is found, commonly under moss; the moth flies in May. (The scientific name is *Odontopera bidentata*.)



118. The Scalloped Oak (*Crocallis elinguaria*).

118. The Scalloped Oak.—Wings very slightly scalloped or angled; fore wings yellow-ochre, with a broad transverse band in the middle pale brown, with darker boundary lines, and a very dark central spot; hind wings paler than the fore wings, without a band, but having a central dot; there is also a row of dark dots near the hind margin of both fore and hind wings; head, thorax and body yellow-ochre. The caterpillar feeds chiefly on honeysuckle, but also on beech, blackthorn, apple and pear; it is of uniform thickness throughout, and the skin appears too big for the body, and folds or overlaps at every segment; it is of a brown-grey colour, and exactly resembles a twig. It lives throughout the winter in the larva state about half-grown, and turns to a chrysalis in June; it makes its cocoon between leaves, generally on the ground, but often under moss on the trunks of trees; it should be searched for in June, and the moth appears on the wing in July and August. (The scientific name is *Crocallis elinguaria*.)



119. The Large Thorn (*Ennomos alniaria*).

119. The Large Thorn.—All the wings with deeply-scalloped margins, yellow, inclining to orange along the hind margin; the surface of the fore wings is dotted with pale brown; there is an indistinct bent line near the base of each fore wing, then an indistinct spot, then a second indistinct and very oblique line; the fringe is variegated, the angles being very dark, the indentations very pale; head, thorax and body yellow. It is said that three specimens of this conspicuous French insect have been blown across the Channel. The caterpillar is nearly two inches long, and in France and Germany feeds on elder, birch, beech, plum, apple, pear and apricot; it is rather more slender before than behind; it is of a purple-brown colour, and adorned with several yellow spots; in the autumn it spins

a slight cocoon under a leaf or on the ground, and mingles husks of corn in its cocoon whenever it can procure them. (The scientific name is *Ennomos alniaria.*)



120. The Canary-shouldered Thorn (*Ennomos tiliaria*).

120. The Canary-shouldered Thorn.—All the wings with slightly scalloped and angled margins; orange-yellow, marked with minute short streaks of brown; the fore wings have two very oblique dark lines extending from the costa to the inner margin, both of them slightly curved, and the inner one slightly angled near the costa; between these two lines, and equally distant from both, is a short central transverse mark of the same colour; head and thorax very hairy, of a beautiful canary-yellow; body yellow. The canary-coloured thorax is the distinguishing mark of this species. I know nothing of the caterpillar of this moth. Mr. Stainton, translating Treitsche, says it is wrinkled, brown, marbled with darker brown, with humps on the sixth and tenth segments gradually increasing in size; it feeds on birch, oak, &c. The caterpillar is found in June, the moth in August. (The scientific name is *Ennomos tiliaria.*)



121. The Dusky Thorn (*Ennomos fuscantaria*).

121. The Dusky Thorn.—Wings slightly scalloped and angled, dull ochre frequently becoming almost lead-colour towards the hind margin; fore wings with two very oblique transverse lines, which are distant on the costa, but gradually approach until they almost touch on the inner margin; between them is a slight indication of the usual central mark; the hind wings have scarcely any indication of marking; head, thorax and body brownish. The eggs are almost square, with the angles rounded; they are laid close together on the twigs of the ash-tree, generally near the tip is formed a curious series, a good deal resembling a tape-worm. The young caterpillar at first is a dark opaque green, but becomes lighter with age, and, when full grown, is a uniform pale green, with scarcely any trace of markings; it eats round holes in the ash-leaves, very much like those we commonly see cut out of rose leaves by the leaf-cutter bee; the chrysalis is suspended within a curled-up leaf, it is green, but assumes a purplish tint two days before it changes to a moth. (The scientific name is *Ennomos fuscantaria.*)



122. The September Thorn (*Ennomos erosaria*).

122. The September Thorn.—All the wings are angulated, but not acutely; variable in colour, but generally ochre-yellow, and with delicate short transverse streaks; the fore wings have two transverse lines of darkish brown, the first of them is very slightly bent backwards near the costal margin; hind wings paler than the fore wings, and having a very pale indistinct brown line across the middle. Caterpillar very clouded and marbled with brown, with humps on the back of the third, sixth, eighth, ninth and twelfth segments, and on the sides of the seventh. It feeds on birch, oak and other trees. The moth flies in August and September, coming to gas-lights; it used to be common near London, but has disappeared within the last few years; it still occurs in many parts of thekingdom, particularly in the New Forest, in Hampshire. (The scientific name is *Ennomos erosaria.*)



123. The August Thorn (*Ennomos angularia*).

123. The August Thorn.—All the wings are angulated, but not acutely; very variable in colour, but generally ochre-yellow, with numerous delicate, very short transverse streaks of brown; the fore wings have two very oblique transverse brown lines, that nearest to the base of the wing sharply bent backwards near the costal margin; between these, and near the costa, is a distinct brown spot; hind wings paler ochreous than the fore wings, and having a very slight indication of a transverse brown line across the middle. Extremely difficult to distinguish from the preceding, but the inner brown line always seems more decidedly angled, and the caterpillars of the two are described as decidedly different. The caterpillar of this species is red-grey, marbled with brown, and having, on the sixth and seventh segments, three warts or humps; one of these is on the middle of the back, and one on each side; the ninth segment has a large hump on the middle of the back, and the twelfth has two small warts. It feeds on oak, birch, elm, lilac, &c., in June, and the moth flies in August and September and is a visitor to every gas-light in the neighbourhood of London during those months. (The scientific name is *Ennomos angularia*.)



124. The Feathered Thorn (*Himera pennaria*).

124. The Feathered Thorn.—The fore wings are pointed at the tip, but have no other conspicuous angle; margin of the hind wings only scalloped; fore wings pale reddish-brown, sprinkled all over with small brown dots, and having a round white spot near the tip, very bright and conspicuous in the males, but obscure in the females: they have also two oblique transverse lines of a darker brown, the outer of which, that nearest to the hind margin, is accompanied by a pale line on the outside; between these transverse lines, and rather near the costal margin of the wing, is a very distinct brown spot; hind wings pale, except near the hind margin, where they are the same colour as the fore wings; across the middle of the hind wings is a nearly straight transverse brown line, very indistinct, and between this and the base of the wing is a brown spot: head red-brown, eyes very black, antennæ of the male beautifully feathered, shaft snowy white, the plumes red-brown; thorax red-brown, the body pale. The caterpillar is a pale whitey-brown colour, and without humps or warts, except two red points just before the tail; in some specimens I have seen the diamond-shaped spots along the middle of the back mentioned by Hubner, but generally they are scarcely perceptible. It feeds on oak in May, and the moths come to gas-lamps in October. (The scientific name is *Himera pennaria*.)

FAMILY III.—AMPHYDASYDÆ.

125. The Pale Brindled Beauty (*Phigalia pilosaria*).
126. The Belted Beauty (*Nyssia zonaria*).
127. The Small Brindled Beauty (*Nyssia hispidaria*).
128. The Brindled Beauty (*Biston hirtaria*).
129. The Oak Beauty (*Amphydasis prodromaria*).
130. The Peppered Moth (*Amphydasis betularia*).



125. The Pale Brindled Beauty (*Phigalia pilosaria*).

125. The Pale Brindled Beauty.—The female has no wings, my description will therefore apply only to the male. Wings rounded without any trace of angles, mottled grey, with four waved transverse bars merely indicated, that is, looking as though they had been plainly visible once, but had been almost rubbed out. The wings have altogether a worn or semi-transparent appearance; the scales seem thinly spread over the surface, some of them white, others black, others brown, and so few of the same colour together as to give the whole a grizzled appearance without any determined colour or markings. Hind wings of the same colours, but fainter; antennæ feathered; thorax very stout and hairy, rather darker coloured than the fore wings; body not so stout, of the same colour. The caterpillar feeds on oak, but I have never met with it. Guenée describes it as of a grey-brown colour, clouded with red-brown, and as having warts on the fifth, sixth, seventh and twelfth segments. The moth is a very early one, flying in February and March; it is not common near London, but is abundant in the north and west of England. (The scientific name is *Phigalia pilosaria*.)

126. The Belted Beauty.—The female is entirely without wings; the wings of the males are without any angles, small and rounded; the fore wings dark grey, and having two very distinct transverse bars parallel with the hind margin, and an irregular white



126. The Belted Beauty (*Nyssia zonaria*).

longitudinal stripe extending from the base of the wing almost to the first transverse bar, and including a short, narrow transverse black bar, and several black rays. The hind wings are white, with a dark-grey hind margin, a dark-grey transverse bar parallel with the margin, and a second transverse and zigzag dark-grey bar across the middle of the wing; antennæ feathered; thorax very stout and hairy, dark smoky grey with two longitudinal white stripes, and a dash of white at the base of each wing; body black, with six pinked yellow belts, the sides and tip fringed with long whitish-grey hairs. The caterpillar is without humps and of a dingy-green colour marbled with whiter shades, and having a yellowish stripe along each side; it feeds on the common yarrow. This moth has only been found in one locality in Great Britain, and I had the great pleasure of making the discovery known to entomologists by the following particulars which I inserted in the *Entomological Magazine*. Mr. Eveleigh, the President of the Banksian Society of Manchester, supposing this beautiful and interesting moth new to science, most kindly brought three specimens to London that I might describe and name the species. Previously, however, to doing this, I took them to the late James Francis Stephens, then our oracle in all matters relating to insects, and found from that gentleman that they were as completely unknown to him as to Mr. Eveleigh and myself. Not satisfied with this failure of obtaining information, and feeling confident that so striking an insect must

have been previously described, I next visited the late J. G. Children, who was then principal zoologist in the British Museum, and whose unrivalled collection of entomological works was always at the service of entomologists seeking information. The supposed new moth was soon made out to be the Geometra zonaria, both of Hubner and Duponchel. The discoverer was Mr. Nicholas Cook, who found a single specimen on some rushes at Black Rock, near Liverpool, in September, 1832, and the following year about twenty specimens, females as well as males, were taken on the same spot. Since then it has been taken in profusion in three or four localities in the same neighbourhood, all of them so near together as to be regarded as one, which has been variously recorded under the names of Birkenhead, the Red Nun, Blackrock and New Brighton. They are all in Cheshire. (The scientific name is *Nyssia zonaria*.)



127. The Small Brindled Beauty (*Nyssia hispidaria*).

127. The Small Brindled Beauty.—The female is entirely without wings. The male has small rounded wings, dark brown, with a broad transverse paler band very near the hind margin; on the dark part of the wing are slight indications of two darker, almost black, transverse zigzag lines; the fringe is long and dark brown, with a few pale spots; hind wings pale smoke-coloured, with a darker but indistinct transverse bar in the middle; antennæ feathered and ochre-yellow-coloured; head black; thorax very large, square and hairy, black, powdered with grey; body black and very hairy. I never found the caterpillar of this moth, but it is described in Mr. Stainton's Manual as brown-grey, more or less variegated with delicate orange markings, with a few orange warty protuberances. It feeds on the oak. This moth is abundant in Richmond Park, where the chrysalis is dug up round the roots of oak trees; also in the New Forest, in Hampshire, and in the north of England, but I do not consider it generally common. (The scientific name is *Nyssia hispidaria*.)



128. The Brindled Beauty (*Biston hirtaria*).

128. The Brindled Beauty.—All the wings smoky-brown, sprinkled with dots of yellowish-brown; the fore wings of the male have six irregular rather indistinct narrow transverse black bands; two of them are almost close together near the base of the wing; the third crosses the wing rather before the middle; the fourth, fifth and sixth are close together and half way between the third and the hind margin; and the margin itself is spotted with black; the hind wings are rather more smoke-coloured and rather more transparent than the fore wings; they have three transverse waved blackish lines, very distinct on the inner margin only. The wings of the female have the same markings as those of the male, but are more transparent. The antennæ of the male are beautifully feathered; those of the female thread-like; the head, thorax and body are of the same colour as the wings; the thorax of the male very hairy.

The caterpillar is without humps; the ground colour is of two shades, dingy purple-brown and red-brown; these colours are arranged in alternate stripes from head to tail, and each two stripes are divided by an irregular black line; on the back of each segment are two small raised bright-yellow spots; there is a ring of the same yellow colour just behind the head, and a row of seven yellow spots along each side; the head, feet and claspers are pink, dotted with black. This caterpillar feeds in June and July on pear, plum, lime, &c., and sometimes occurs in such numbers about London as to strip the tree-

of their leaves. When full fed it buries itself in the earth and changes to a blackish and somewhat dumpy chrysalis; the perfect moth comes out the following April, and crawls up the trunks of trees, more particularly in the squares of London, where twenty or thirty may sometimes be seen on one tree. (The scientific name is *Biston hirtara.*)



129. The Oak Beauty (*Amphydasis prodromaria*).

129. THE OAK BEAUTY.—Fore wings dirty white, with two irregular broad brown bands; the first of these bands is short, and near the base of the wing; its outer edge is bordered with black; the second band is near the hind margin, and its inner edge is bordered with black; the whitish space between these two bands is sprinkled with black dots, and there is a crescent-shaped black mark near the middle; the whitish space along the hind margin is also variously dotted with black; the hind wings are paler than the fore wings, and are transversely waved with black. The antennæ are feathered in the male, thread-like in the female; the forehead is white, the front of the thorax also white; the sides whitish-grey, and the back of the thorax as well as the body brown.

I never found the caterpillar of this handsome moth: it is described as being brown, marbled with white, and as having two small reddish lumps on the back of the eighth, ninth and twelfth segments, and a small lump on the belly on the seventh, eighth and ninth segments; the head is slightly notched in the middle: it is found feeding in July and August on oak and birch; the moth comes out in the following March and April: it is not common. (The scientific name is *Amphydasis prodromaria.*)



130. The Peppered Moth (*Amphydasis betularia*).

130. THE PEPPERED MOTH.—All the wings dingy white, speckled and streaked with smoky brown; head white; antennæ of the male feathered and smoky-black; of the female thread-like, black, ringed, with white thorax and body dingy-white, spotted with black. A very variable insect; some specimens have a very decided pattern, others are sprinkled all over with small black spots, and others again are black and unspotted.

Caterpillar with the head deeply notched in the middle; the ground-colour is various; I have seen them almost the colour of putty, but some have a green tinge, and others a tinge of red-brown; on each side of the fifth, sixth, seventh, eighth, tenth and eleventh segments is a reddish raised spot, and there are two such spots on the back of the ninth and twelfth segments. It feeds in August on acacia, lime, birch, oak and many other trees; it buries itself in the ground in September, and turns to a rather brown, rather dumpy chrysalis: the perfect moth comes out the following May. (The scientific name is *Amphydasis betularia.*

FAMILY IV.—BOARMIDÆ.

131. The Waved Umber (*Hemerophila abruptaria*).
132. The Speckled Beauty (*Cleora viduaria*).
133. The Dotted Carpet (*Cleora glabraria*).
134. The Brussels Lace (*Cleora lichenaria*).
135. The Mottled Beauty (*Boarmia repandata*).
136. The Willow Beauty (*Boarmia rhomboidaria*).
137. The Satin Carpet (*Boarmia abietaria*).
138. The Ringed Carpet (*Boarmia cinctaria*).
139. The Great Oak Beauty (*Boarmia roboraria*).
140. The Pale Oak Beauty (*Boarmia consortaria*).
141. The Square Spot (*Tephrosia consonaria*).
142. The Small Engrailed (*Tephrosia crepuscularia*).
143. The Engrailed (*Tephrosia biundularia*).
144. The Brindled White-spot (*Tephrosia extersaria*).
145. The Grey Birch (*Tephrosia punctulata*).
146. The Annulet (*Gnophos obscurata*).
147. The Scotch Annulet (*Dasydia obfuscata*).
148. The Black Mountain Moth (*Psodos trepidaria*).
149. The Dusky Carpet (*Mniophila cineraria*).



131. The Waved Umber (*Hemerophila abruptaria*).

131. The Waved Umber.—All the wings wainscot-brown, the male darker and richer than the female; the fore wings have a central black dot, on both sides of which is a slender zigzag oblique black line; adjoining the outmost of these lines, and extending to the hind margin, is a long dark-brown blotch: hind wings with a very slender zigzag oblique black line across the middle; adjoining this on the outer side is a broad brown transverse band; the same colour prevails above the black line, but fades to pale wainscot-brown at the base of the wing; the fore wings are slightly, the hind wings deeply scalloped at the hind margin. In addition to the markings I have described, there are innumerable delicate lines and tints of brown on all parts of both wings. Antennæ smoky-brown, feathered in the male, thread-like in the female: head and collar brown, thorax paler, body pale brown, ringed with darker brown.

The caterpillar is of a dark-brown colour with a whitish ring close behind the head, it feeds on lilac and rose, and spins a silken cocoon on the twigs just behind the point where two twigs separate: the moth frequents gardens in May and August; the caterpillars are to be found in June. The Rev. Mr. Hellins thus writes of this moth: "It is undoubtedly double-brooded. From eggs laid in May I bred the perfect insect in August. Perhaps it would be well to mention that at the time these latter moths appeared some of the produce of the very same batch of eggs were still feeding as larvæ, though hatched at the same time and treated in the same way as their precocious brethren. I noticed that the slow feeders attained a much greater size than the fast ones, and expect to breed larger moths from them; when first hatched these larvæ have a beautiful purple stripe on the back, but they soon lose it." (The scientific name is *Hemerophila abruptaria*.)



132. The Speckled Beauty (*Cleora viduaria*).

132. The Speckled Beauty.—Fore wings dingy-white, adorned with smoky-black markings, most of which cross the wing transversely; on the hind margin are seven crescent-shaped black spots; hind wings dingy-white with minute black specks; and a black line along the hind margin; head white; eyes black; antennæ black, feathered in the male, thread-like in the female; thorax and body dingy-white, the body indistinctly spotted with black.

This moth only occurs in Sussex and in the New Forest, in Hampshire; its caterpillar is unknown; the moth flies in June. (The scientific name is *Cleora viduaria*.)

133. The Dotted Carpet.—Wings dingy white, delicately sprinkled over with minute



133. The Dotted Carpet (*Cleora glabraria*).

black dots, and adorned with many other black markings, the most conspicuous of which is a central black spot; round the hind margin of all the wings is a narrow black line: on the costal margin of the fore wings are four black spots, the first and third of which communicate with transverse, irregular, and often interrupted black lines; the second joins the central black spot; the forth communicates with a waved but rather indistinct black band, which crosses the wing near the hind margin.

Zeller, as quoted by Mr. Stainton, describes the caterpillar of this moth as greenish-white, with a black spot on the back of each segment. It feeds on the lichens which grow on fir-trees. It occurs in the lake district of Westmoreland, and in the New Forest of Hampshire. The caterpillar is found in May, the moth at the end of July. (The scientific name is *Cleora glabraria.*)



134. The Brussels Lace (*Cleora lichenaria*).

134. The Brussels Lace.—Green-grey, clouded with darker shades of the same colour; there are two black transverse lines across the fore wings; the first is near the base, slightly curved, and is accompanied on its inner side by a paler line; the second is beyond the middle, very zigzag, and accompanied on the outer side by a paler line; midway between the two lines is a black central spot; the hind wings are rather paler than the fore wings, with one zigzag blackish line situated rather beyond the middle, and accompanied on its outer side by a paler line. The antennæ of the male are feathered, of the female thread-like; the head, thorax and body are green-grey.

The caterpillar is green-grey, the same colour as the moth, but is much more beautifully marked, the colours being brighter and more distinct; there are two little humps on each of the segments from the fifth to the twelfth inclusive, those of the fifth and ninth being the largest. I had about twenty caterpillars of this species in 1859, found on lichen on park palings; and they so exactly resembled the lichen in colour and appearance, that it was extremely difficult to distinguish them. The caterpillar feeds in September and again in May, hybernating during winter; the moth flies in July, and is tolerably common. (The scientific name is *Cleora lichenaria.*)



135. The Mottled Beauty (*Boarmia repandata*).

135. The Mottled Beauty.—Smoky grey-brown tinged with orange-brown, having a number of waved markings both darker and lighter transversely crossing all the wings. These vary so much in different specimens, that it is impossible to write any description that will apply to all; there is, however, a paler transverse line running through all the wings, near the hind margin, that appears to be always present; the hind margin itself is surrounded by a delicate scalloped black line. The antennæ are feathered in the male, thread-like in the female; the head, thorax and body are brownish-grey. A variable species; one specimen which I possess has a broad central dark-brown band on all the wings; others have the transverse lines clearly defined on a paler ground; others again have all the marks suffused, mixed and indistinct.

The caterpillar may be found in early spring feeding on plum and birch trees in our gardens; it is of a yellow-grey tint, dotted with black, a line along the back and another

on each side paler. The moth flies in June and July, and is very common. (The scientific name is *Boarmia repandata.*)



136. The Willow Beauty (*Boarmia rhomboidaria*).

136. THE WILLOW BEAUTY.—All the wings grey-brown; a dark-brown crescent-shaped spot in the middle of the fore wings; several transverse-waved lines or bands are more or less plainly marked on all the wings; the extreme hind margin of all the wings is surrounded with a delicate zigzag black line just within the fringe; near the hind margin, and almost parallel with this marginal black line is a pale zigzag line, very indistinct in some specimens, but plainly observable in others; this commences very near the tip of the fore wings, and terminates in the anal angle of the hind wings; the lower half of this line on the fore wing is nearly straight; antennæ of the male feathered, of the female thread-like; head, thorax and body grey-brown.

The caterpillar is dingy grey, and very stick-like, but is slightly variegated with darker markings, and has a pale-yellowish line along each side by the spiracles; on each side of the sixth segment there is a slight hump just below this line. It feeds in gardens on roses, plums, birch, &c. The caterpillar is found in September, the moth in June and July, sitting on walls, fences and the trunks of trees; it is very common everywhere. (The scientific name is *Boarmia rhomboidaria.*)



137. The Satin Carpet (*Boarmia abietaria*).

137. THE SATIN CARPET.—Grey-brown, shaded with velvety black-brown; a central crescent-shaped spot on the fore wings very black; a row of crescent-shaped black marks round the hind margin of all the wings; a saffron-coloured tint is observable on fine specimens of this moth; the antennæ are long, feathered in the male, thread-like and very black in the female. A very local moth, found only in pine forests, sitting on the trunks of the pines in July.

I know nothing of the caterpillar, but Mr. Stainton gives the following description from Freyer:—Reddish-grey, often paler or yellowish on the back; subdorsal lines black, interrupted; spiracular line yellowish: it feeds on fir. (The scientific name is *Boarmia abietaria*)



138. The Ringed Carpet (*Boarmia cinctaria*).

138. THE RINGED CARPET.—Black-brown, with several transverse-waved darker lines; near the middle of the fore wings is a pale crescent-shaped spot surrounded with a black line; beyond this, that is, nearer the tip of the wing, is a conspicuous narrow black transverse line, and again outside of this is an umber-brown transverse band, in fine specimens distinct, in worn specimens indistinct; the hind wings are paler than the fore wings, especially at the base, and are marked with several waved transverse black lines more or less distinct; the antennæ are feathered in the male, thread-like in the female; head, thorax and body grey-brown.

The caterpillar of this pretty moth I have never met with, but it is described by Treitschke as having a notched head, and a small hump on each side of the fifth segment: it is of a dark-brown ground colour, with a row of whitish lozenge-shaped marks along the back on the fifth, sixth, seventh and eighth segments. It feeds on heath. The caterpillar is found in September, the moth in May and June. (The scientific name is *Boarmia cinctaria.*)



139. The Great Oak Beauty (*Boarmia roboraria*).

139. THE GREAT OAK BEAUTY.—The antennæ of the male are strongly pectinated, those of the female simple: the wings are gray, powdered with minute black spots, and having also numerous black or dark-brown markings; the most conspicuous of these are four black spots on the costal margin of the fore wings, each of which, except the first, seems to originate an irregular, indistinct, and interrupted transverse black line; the first and second of these lines are wide apart at their commencement on the costal margin, but almost meet on the inner margin; the second is composed of a number of sharp angles; the third is waved or scalloped, and beyond it is a similarly-shaped paler line; there is a row of crescent-shaped black spots along the hind margin; near the middle of the wing is a crescent-shaped black spot, often very indistinct; the hind wings are marked very much as the fore wings, but rather less distinctly: first, there is an oblique band across the wing near its base, then a crescent-shaped black spot, then a zigzag black line, then a slightly-waved black line, and lastly, a very distinct row of crescent-shaped black spots on the scalloped hind margin: the head, thorax, and body are gray.

The CATERPILLAR is very large, and resembles a piece of stick; there is a rather darker medico-dorsal stripe, and a rather paler lateral stripe; the space between them is varied with black and white; there are two rather small humps on the sides of the sixth segment, and one underneath the seventh segment: it feeds only on oak.

The MOTH appears on the wing in June, and has been taken in the New Forest, Hampshire; in Tilgate Forest, Sussex; in Richmond Park, Surrey; in Dorsetshire; in Birchwood, Kent; in Epping Forest, Essex; and is also reported from Berkshire, Worcestershire, Lancashire, Yorkshire, and Ireland. The chrysalis used formerly to be found in some abundance by digging round the trunks of oak trees in Richmond Park, but latterly it has been rare in that locality. (The scientific name is *Boarmia roboraria.*)



140. The Pale Oak Beauty (*Boarmia consortaria*).

140. THE PALE OAK BEAUTY.—The antennæ of the male are slightly pectinated, those of the female simple: all the wings are gray, powdered with minute black specks; the base of the fore wings, and a narrow-waved band across the middle of all the wings, dingy yellow brown; there is a zigzag or scalloped black line near the hind margin of all the wings, accompanied exteriorly by a paler line of exactly similar shape; in the middle of the hind wings is a crescent-shaped mark, gray in the middle: the head, thorax, and body are gray.

The CATERPILLAR is greenish-gray, with a darker medio-dorsal stripe, and a rather paler lateral stripe; there are two small humps on the back of the sixth segment, and two small black warts on the twelfth segment; it feeds on oak.

The MOTH appears on the wing in June, and has been taken in the New Forest, Hampshire; at Pembury, in Sussex; at Darvent, in Kent; in Essex; and near Stowmarket, in Suffolk; but neither in the north of England, in Scotland, nor in Ireland. (The scientific name is *Boarmia consortaria.*)



141. The Square Spot (*Tephrosia consonaria*).

141. THE SQUARE SPOT.—The antennæ are almost simple in the male, quite so in the female: the male and female of this insect are very dissimilar as regards the colour of their wings: the male has a gray ground-colour tinged with red-brown; it possesses several transverse shades and markings, but they are very indistinct: the ground-colour of the female is gray, without the red-brown tinge, and its markings are most distinct and conspicuous; near the base are two short, curved, transversed bars, the outer narrower but more distinct than the inner; beyond the middle of the wings are two more distinct and zigzag dark lines, and these are united in the middle by a square brown spot; the outer of these lines is accompanied by a pale line of the same form: the head, thorax, and body are gray.

The EGG is laid in May, on the trunks of birch (*Betula alba*), beech (*Fagus sylvatica*), and more rarely on hornbean (*Carpinus betulus*), on which trees the CATERPILLARS feed. They are full-fed in June and July.

The MOTH appears on the wing in May and June, and has been taken freely at Brighton; in the New Forest, Hampshire; at Pembury and Worthing in Sussex; in Halton in Buckinghamshire; at Stowmarket in Suffolk; and more particularly at Birchwood in Kent, where I have repeatedly found it on the trunks of the larch trees formerly so abundant there—a fact the more noteworthy, since the caterpillar has never been known to feed on any species of fir. Mr. Birchall says it is common in Ireland: he has taken it in the counties Wicklow and Kerry. (The scientific name is *Tephrosia consonaria*.)



142. The Small Engrailed (*Tephrosia crepuscularia*).

142. THE SMALL ENGRAILED.—The antennæ of the male are very slightly ciliated, those of the female simple: the colour of the wings is gray, with a yellow-brown tinge; all the wings have transverse zigzag black lines, the most conspicuous of them crosses each of the four wings about the middle, the other black or dark lines follow the same direction as this, but are more liable to vary.

The MOTH appears on the wing in April, and occurs in most of our English counties, and Mr. Bristow is said to have taken it in Ireland. (The scientific name is *Tephrosia crepuscularia*.)



143. The Engrailed (*Tephrosia biundularia*).

143. THE ENGRAILED.—The antennæ of the male are slightly ciliated, those of the female simple: the colour of the wings is gray, with a slight tinge of ochreous, and having numerous transverse dark lines, the most conspicuous of which are two on the fore wings and one on the hind; the first of these on the fore wings is short and near the base of the wing; the second is oblique and situated beyond the middle of the wing.

Some EGGS of this species were laid by a captured female from the 21st to the 27th of May, and were hatched on the 5th of June. These CATERPILLARS vary exceedingly, but more in the colour than in the disposition or

the markings. The usual food-plant is oak (*Quercus Robur*), but they feed freely on the leaves of the plum in confinement, and are full-fed the first week in July.

The MOTH appears on the wing in April, and generally again in July; its geographical range in this country is, without doubt, very extensive, but unascertained on account of the difficulty entomologists find in distinguishing between this and the preceding species. (The scientific name is *Tephrosia biundularia.*)



144. The Brindled White-spot (*Tephrosia extersaria*).

144. THE BRINDLED WHITE-SPOT.—The antennæ are nearly simple in both sexes: the wings are smoky-gray, sprinkled all over with smoky-brown: the fore wings have four transverse blackish lines, the first near the base is slightly curved, the second crossing the middle of the wing is of the same shape as the first; between these two is a crescent-shaped blackish mark not always very distinct; the third transverse line is generally broken up into black spots; the fourth is exactly half-way between the third and the tip of the wing; it is accompanied on the outside by a slender zigzag white line, and both the black and white lines terminate in a conspicuous white blotch, which is situated half-way between the costa and the anal angle: the hind wings have several transverse markings, but these are far less conspicuous than those I have described in the fore wings: the head, thorax, and body are gray-brown.

The CATERPILLAR is gray, clouded with reddish brown; it feeds on birch; it is found in September, and remains in the CHRYSALIS state during winter, the moth making its appearance the following June.

The MOTH appears on the wing in June, and has been taken in Cornwall, New Forest, Hampshire, Dorsetshire, Sussex, Surrey, Essex, Berkshire, Buckinghamshire, Oxfordshire, Gloucestershire, Worcestershire, and Suffolk, but not in Scotland or Ireland. (The scientific name is *Tephrosia extersaria.*)



145. The Gray Birch (*Tephrosia punctulata*).

145 THE GRAY BIRCH.—The antennæ in both sexes are simple: the wings are gray sprinkled over with smoky-brown; on the costal margin of the fore wings are four very conspicuous black spots, nearly equally distant from each other; these spots are long and narrow, and fade into interrupted dotted black lines, which terminate on the inner margin; there are some transverse markings on the hind wings, but they are very indistinct: the head, thorax, and body are smoky-gray.

The CATERPILLAR is smooth, and of a reddish colour, with white spots or blotches on the back of all the segments; it feeds on birch (*Betula alba*), and may be met with throughout the month of August.

The MOTH appears on the wing in May and June. It is a very common species round London, particularly at Birch and Darent Woods in Kent, and has occurred more or less plentifully in all our English counties, from Devonshire and Sussex to Yorkshire. I have seen no Scottish specimens; but Mr. Birchall reports it from the counties Wicklow and Kerry in Ireland. (The scientific name is *Tephrosia punctulata.*)

146. THE ANNULET.—The antennæ of the male are very slightly ciliated, those of the female simple: the wings vary in colour from pale pearly-gray to very dark smoky-brown, almost black, but the fore wings invariably have two transverse zigzag black lines, and the hind wings one; between these transverse lines on each fore wing is a black ring or annulet, and on each hind wing, very near the



146. The Annulet (*Gnophos obscurata*).

middle, is another annulet: the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in July, and has occurred abundantly in Cornwall, Devonshire, Somerset, Dorset, in the New Forest, Hampshire, Tilgate Forest in Sussex, Farnham Heath in Surrey, and also in Wales, the North of England, and Scotland; Mr. Birchall says it is generally distributed and common in Ireland. (The scientific name is *Gnophos obscurata.*)

The CATERPILLAR very much resembles the moth in colour, being gray of various shades, the back paler than the sides, and the fore part of each segment paler than the hind part; it feeds at night on the salad burnet (*Poterium sanguisorba*), and the sun cistus (*Helianthemum vulgare*), concealing itself under stones or among the roots of the grass by day, and may be obtained by pulling up and shaking tufts of grass. The EGG is laid in July and August, and the young caterpillar is hatched in a few days, and continues to feed and to grow slowly until the end of September, when it is about half-grown, and then hybernates, reappearing in the spring, and beginning to feed again in April.



147. The Scotch Annulet (*Dasydia obfuscata*).

147. THE SCOTCH ANNULET.—The antennæ are very long and slender, ciliated in the male, simple in the female: the colour of the wings is smoky-gray, suffused in recent specimens with greenish or purplish, pearly reflections, rarely to be observed in cabinet specimens: near the middle of each of the fore wings is a faint ring of a darker colour, and there is a dark spot in the middle of each hind wing; there are two very obscure transverse darker lines on the fore wings, and one on the hind wings, and these are accompanied by paler and broken white lines equally obscure; the fore-wings are rather pointed, and the hind margin of the hind wings is waved, but not scalloped: the head, thorax, and body are smoky-gray.

The CATERPILLAR is described by Guenée as of a violet-gray colour, with a white spiracular line, and an oblique dark gray streak on the side of each segment; it has two small humps on the twelfth segment; it feeds on the dyer's green weed (*Genista tinctoria*), and various species of vetch.

The MOTH appears on the wing in July and August; it has only been taken among the Scotch mountains, and in the county Wicklow in Ireland by Mr. Bristow. (The scientific name is *Dasydia obfuscata.*)



148. The Black Mountain Moth (*Psodos trepidaria*).

148. THE BLACK MOUNTAIN MOTH.—The antennæ are simple in both sexes: the fore

wings of the male are smoky-black : of the female, smoky-gray. In both sexes there are two transverse zigzag lines, both of which commence at the costal margin of the wing—the first at one-third, the second at two-thirds of the distance between the base and tip. These lines are most distant at the costal margin, and gradually approach to the inner margin. The part of the wing included between these two lines is darker than the parts outside of them ; but not so dark as a patch at the base of the wing. There is a row of seven black streaks on the hind margin of the wing, just within the fringe : these are very conspicuous in the female, but not so distinct in the male : the hind wings in the male are of uniform colour, but have the same marginal row of black streaks on the hind margin. The hind wings of the female are gray, with a light narrow, zigzag band across the middle, and a light broad band along the hind margin. The head, thorax, and body are quite black, and very hairy.

The MOTH appears on the wing in July, and was taken in the Highlands of Scotland by the late Mr. Wrenn and the late Mr. Foxcroft. I am not aware of its having been seen in England, Wales, or Ireland. (The scientific name is *Psodos trepidaria.*)



149. The Dusky Carpet (*Mniophila cineraria*).

149. THE DUSKY CARPET.—The antennæ of the male are ciliated, those of the female simple : the fore wings are gray, with three transverse darker waved lines : the first and third are very decidedly marked, and very distinct ; the middle one is paler, and very obscure ; the hind margin of the wing is bordered with a zigzag dark line, and the fringe is slightly spotted : the hind wings are paler than the fore wings, and have an indistinct transverse line, and a distinct marginal line like that of the fore wings : the head, thorax, and body are gray.

It is said that a specimen was once taken at Tenby, in South Wales, but I have never seen it. (The scientific name is *Mniophila cineraria.*)



150. The Waved Black (*Boletobia fuliginaria*).

150. THE WAVED BLACK.—The antennæ are pectinated in the male, simple in the female : all the wings dark smoky-brown, the basal half darker than the outer half, and bordered by a slight, black, zigzag line : this darker portion of the wing has an indistinct, crescent-shaped black mark near the middle ; beyond this darker part of the wing is a broad paler band which, on the fore wings, ends in a pale blotch, near the inner margin : the head, thorax, and body gray.

The MOTH appears on the wing in June ; three or four have been taken in kitchens and coal cellars in London and one at Worcester. (The scientific name is *Boletobia fuliginaria.*)



151. The Grass Emerald (*Pseudoterpna cytisaria*).

151. THE GRASS EMERALD.—The fore wings are gray-green, with two indistinct tranverse darker lines, the first nearly straight, the second zigzag : these two lines are widely separated at the costal margin, and very near the inner margin. Between these is an indistinct, crescent-shaped spot of the same colour ; and beyond them is a third line, also zigzag and almost white : the hind wings are paler than the fore wings, and have the white line less distinctly marked : the head, thorax, and

body are the same colour as the wings. It is remarkable, that when this moth comes out of the chrysalis in wet weather, every part of it is suffused with a red tinge.

The CATERPILLAR is green—very much the same colour as the moth. Its head is notched on the crown. It feeds on the common broom. The caterpillar is found in June, and the moth in July.

The EGG is laid on dyer's green-weed (*Genista anglica*) and common broom (*Spartium Scoparium*), generally between the 20th and 30th of July; and the young caterpillars usually emerge in fifteen days: they feed but sparingly, and are very small when winter sets in. My specimens were full-fed on the 14th of June.

The MOTH appears on the wing in July, and is common in most of our English counties; it has also been taken in Scotland, and Mr. Birchall says it is common and generally distributed in Ireland. The scientific name is *Pseudoterpna cytisaria.*)



152. The Large Emerald (*Geometra papilionaria*).

152. THE LARGE EMERALD.—The antennæ are ciliated in the male, simple in the female: the wings are uniformly green: the fore wings have three transverse, waved, white lines, not very distinct: the one nearest the base much shorter than the others: these lines are very distant at the costal margin, and much nearer at the inner margin: intermediate between the first and second is a crescent shaped, dark green mark; the third or outer line is broken up into crescentic spots: the hind wings have a beautifully scalloped white line passing transversely across the middle, and dividing the wing exactly in half. In the centre of the space enclosed by this scalloped line is a crescent-shaped darker mark; and exactly intermediate, between the scalloped line and the hind margin, is a transverse row of white dots: the antennæ and fore legs are whitish: the head and thorax green; the body nearly white.

The EGGS are laid in the autumn, on birch (*Betula alba*); the young CATERPILLAR emerges in two or three weeks, according to the temperature, and feeds for a short time only, hybernating when very small: in early spring it again begins to feed, and is full-fed towards the end of May. In June it spins together some of the leaves of its food-plant, forming a thin whitish cocoon, in which it changes to a green CHRYSALIS, having brownish wing-cases, and a reddish blotch on the back of the same segments, which have the red-brown stripe in the larva.

The MOTH appears on the wing about midsummer: it is tolerably common in most of our English counties, and has been taken in Scotland. Mr. Birchall says that in Ireland it is common at Killarney and in the county Wicklow. (The scientific name is *Geometra papilionaria.*)



153. The Essex Emerald (*Geometra smaragdaria*).

153. THE ESSEX EMERALD.—All the wings green: the fore wings with two transparent, waved, whitish lines, and a distinct white spot between them: the costal margin of the fore wings is tinged with yellow.

My late friend, Thomas Ingall, found the CATERPILLAR of this species on the Essex coast, but unfortunately did not know what a prize he had obtained until the moth emerged; it was of a dull olive-green, with humps on the sixth and tenth segments.

The MOTH appears on the wing in May, and has only been taken on the coast of Essex. (The scientific name is *Geometra smaragdaria.*)



154. The Small Grass Emerald (*Nemoria viridata*).

154. THE SMALL GRASS EMERALD.—The antennæ are simple in both sexes : the wings are dingy green, often suffused with a reddish tinge : the fore wings have one very distinct, transverse, oblique, whitish line beyond the middle, and a second very indistinct and shorter transverse line nearer the base : this second or inner line is frequently wanting : hind wings with a slight angle near the middle of the hind margin, and an oblique whitish line across the middle of the wing, meeting the principal white line on the fore wings : crown of the head whitish ; thorax and body dull dingy green.

The MOTH appears on the wing in May and June, and has been taken in Devonshire, Dorsetshire, Hampshire, Worcestershire, Lancashire, and the Lake District generally, and Mr. Bristow is said to have taken it in the county Wicklow, in Ireland. (The scientific name is *Nemoria viridata.*)



155. The Small Emerald (*Iodis vernaria*).

155. THE SMALL EMERALD.—The antennæ are ciliated in the male, simple in the female ; the wings of the most lovely green ; the fore-wings with two, the hind wings with one, very distinct, white, transverse lines ; the head, thorax, and body delicate green.

The CATERPILLAR has a porrected head, deeply notched on the crown ; the body is green, with two whitish stripes on each side. It feeds on the traveller's joy (*Clematis vitalba*).

The MOTH appears on the wing in July, and has been taken in Devonshire, Dorsetshire, Sussex, Surrey, Essex, Kent, Buckinghamshire, Gloucestershire, Herefordshire, and Worcestershire ; of course it only occurs where the clematis is abundant. (The scientific name is *Iodis vernaria.*)



156. The Little Emerald (*Iodis lactearia*).

156. The LITTLE EMERALD.—The antennæ are distinctly ciliated in the male, simple in the female ; the wings are white ; but when the moth first emerges from the chrysalis, tinged with the most lovely green ; a transverse and oblique, but nearly straight, line, whiter than the ground colour, across the wing at two-thirds of the distance passes between the base and hind margin ; this white line is continued in the same direction across the hind wing : the antennæ, head, thorax, and body are white, or almost so.

The MOTH appears upon the wing a little before Midsummer, and occurs in most of our English counties, and in some localities in Scotland. Mr. Birchall says it is generally distributed in Ireland. (The scientific name is *Iodis lactearia.*)



157. The Blotched Emerald (*Phorodesma bajularia*).

157.—THE BLOTCHED EMERALD.—The antennæ are ciliated in the male, simple in the female ; the wings green ; the fore wings with two slender transverse whitish lines ; that nearest the base of the wing is somewhat waved, the outer one is slightly zigzag, and terminates in a large, squarish, pale blotch near the anal angle ; this blotch is dingy white, but tinged with red-brown in the middle ; the fringe is white, spotted with

brown: the hind wings have a large pale spot at both angles, and these are connected by a scalloped marginal line, in the centre of which is a slender scalloped brown line; the head is white; the body and abdomen are whitish green.

The MOTH appears on the wing at the end of June, and has been taken in Devonshire, Dorsetshire, Hampshire, Sussex, Surrey, Essex, Bucks, Norfolk, Suffolk, Gloucester, Worcester, Derbyshire, the Lake District, and Yorkshire. I have nowhere found it abundant. (The scientific name is *Phorodesma bajularia;* both the names are descriptive of the habits of the caterpillar.)



158. The Common Emerald (*Hemithea thymiaria*).

158. THE COMMON EMERALD.—The antennæ are almost simple in both sexes: the wings are dingy green; fore wings with the hind margin scalloped and having two very obscure waved transverse pale lines: hind wings with the hind margin scalloped and angled, and having one waved transverse whitish line across the middle; the fringe is dingy white, spotted with brown: head whitish; thorax and abdomen of the same colour as the wings.

The MOTH appears on the wing in June, and occurs in all our English countries, and occasionally in Scotland. Mr. Birchall took it in the county Galway in Ireland. (The scientific name is *Hemithea thymiaria.*)



159. The False Mocha (*Ephyra porata*).

159. THE FALSE MOCHA.—The antennæ are slightly pectinated in the male, throughout the greater part of their length, but simple at the tips; they are simple throughout in the female; the wings are dull grayish red; the red, in very perfect and recently-disclosed specimens, being brick-dust coloured in the middle of the wing: a transverse brown line crosses the middle of each wing, and just within this, that is, nearer the base of the wing, is a round white spot, with a narrow border; between this white spot and the base of the wing is a transverse row of six or seven brown dots; and half-way between the white spot and the hind margin is a second row of nine or ten brown dots; on the hind margin itself, but within the fringe, is a third row of brown dots: the head, thorax, and body are of the same prevailing colour as the wings.

This species is double-brooded, the MOTH appearing on the wing in May, and again in August: it occurs in the Southern English counties, very generally as far north as Worcester. (The scientific name is *Ephyra porata.*)



160. The Maiden's Blush (*Ephyra punctaria*).

160. THE MAIDEN'S BLUSH.—The antennæ of the male are fringed, of the female, thread-like; the wings dull, grayish red, with a redder tinge about the middle of the wing; a very distinct transverse brown line crosses the middle of the wing; half-way between this brown line and the base of the wing, is a transverse row of six or seven brown dots; and half-way between the brown line and the hind margin, is a second row of nine or ten brown dots; besides these, there is a third row of linear brown spots on the margin, making a continuous marginal line: the head, thorax, and body are of the same prevailing colour as the wings.

The CATERPILLAR is figured by Sepp; like its congeners, it is of two colours, fawn-coloured

or apple-green, with oblique transverse lines on the sides; it feeds on oak (*Quercus Robur*).

This species is double-brooded, the MOTH appearing on the wing in May and September: it occurs in all our English counties, and extends even into Scotland, and Mr. Birchall took it in the county Wicklow, in Ireland. (The scientific name is *Ephyra punctaria.*)



161. The Clay Triple-lines (*Ephyra trilinearia*).

161. THE CLAY TRIPLE-LINES.—The antennæ are pectinated in the male, simple in the female; the wings are fulvous-yellow, without the slightest tinge of red: there are three transverse lines on each wing, the middle one much the darkest, broadest, and most plainly marked; the others are broken and dotted, and often very difficult to perceive: one of my specimens has, on the middle of each wing, a conspicuous white spot, surrounded by a black line, being, in this respect, similar to *Ephyra porata:* the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in May and September, and is not uncommon in the counties of Somerset, Dorset, Hants, Sussex, Surrey, Kent, Essex, Berks, and Hunts; but I think does not occur farther north, in Scotland, or in Ireland. (The scientific name is *Ephrya trilinearia.*)



162. The Mocha (*Ephyra omicronaria*).

162.—THE MOCHA.—The antennæ of the male are slightly pectinated, of the female simple: the wings are whitish-fulvous, with a double, transverse, zigzag, smoke-coloured line across the middle of each, and a ring of the same colour between the zigzag line and the base of the wing: again, between this ring and the base of the wing, is a narrow brown line, composed of two semi-circles: the head, thorax, and body are of the same colour as the wings.

The head of the CATERPILLAR is red above, and pale yellow, almost white, below: the body is a beautiful velvety-green colour, with a slender medio-dorsal stripe, composed of canary-yellow points, as though shagreened on each side; near the medio-dorsal is another stripe, of the same canary-yellow colour and rather waved; and below this, in the region of the spiracles, are the traces of a third very indistinct stripe; the spiracles are small and reddish; the ventral surface is pale glaucous-green, with black dots. It feeds on maple (*Acer compestris*), and usually when full-fed conceals itself among moss, spinning a few threads by way of security, and changes to a smooth green CHRYSALIS, square at the anterior, and pointed at the posterior extremity.

The MOTH appears on the wing in May and August, and occurs frequently in all the southern counties in England, but I think not in the north of England, in Scotland, or in Ireland. (The scientific name is *Ephyra omicronaria.*)



163. The Dingy Mocha (*Ephyra orbicularia*).

163. THE DINGY MOCHA.—The antennæ are pectinated in the male, simple in the female: the wings smoky-gray, mottled and marbled with darker shades of the same colour: in the centre of each wing is a round white spot in a circle of smoky-gray; half-way between this and the base of the wing are some blackish dots, arranged in a very indistinct transverse row; and again, half-way between the white spot and the hind border of the wing, is a second row of blackish dots, arranged in zigzag order; lastly, there is a third row, on the hind

margin, of linear black spots: these are just within the fringe, and constitute an almost continuous marginal line: the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in May and August, and is nowhere common. I used to take it on the palings of my garden at Deptford forty years ago, and then it was reckoned a great rarity; there was a rope-walk immediately adjoining the garden, and a double row of willows seven hundred yards in length: it has since been taken at Brighton and Lewes, and in Dorsetshire, Hampshire, Surrey, and Worcestershire. (The scientific name is *Ephyra orbicularia.*)



164. The Birch Mocha (*Ephyra pendularia*).

164. THE BIRCH MOCHA.—The antennæ are very slightly pectinated in the male, simple in the female: the wings are pale gray, sprinkled thinly over with specks of smoke-colour: in the middle of each wing is a round white spot, surrounded by a smoke-coloured cloud; between this white spot and the base of the wing is a transverse row of three or four smoke-coloured dots; and half-way between the white spot and the hind margin is a second row, consisting of ten or twelve smoke-coloured dots; and again, on the hind margin itself, is a third row of linear black dots: the head, thorax, and body are of the same pale colour as the wings.

The CATERPILLAR is green, tawny, or brown, with paler spiracular line; the head and legs reddish (*Hub.*); it feeds on birch (*Betula alba*). —*Stainton's Manual*, vol. ii., p. 39.

The MOTH appears on the wing in May and August, and occurs in most of our English and Scotch counties: the name is inserted in Mr. Greene's list of Irish *Lepidoptera.* (The scientific name is *Ephyra pendularia.*)



165. The Golden-bordered Purple (*Hyria auroraria*).

165. THE GOLDEN-BORDERED PURPLE.—The antennæ in both sexes are simple and of a yellow colour: the wings are of a purple-red colour, with a double blotch in the middle of the fore wings, a single blotch in the middle of the hind wings, and a broad border on the hind margin of all the wings, deep fulvous-yellow: the thorax is purple; the body bluish, tipped with orange.

The MOTH appears on the wing in July, and has been taken in Dorsetshire, Hampshire, Norfolk, Cambridgeshire, Lancashire, and in the Lake District. Mr. Birchall informs us it is common on the heaths of the south and west of Ireland. (The scientific name is *Hyria auroraria.*)



166. The Small Yellow Wave (*Asthena luteata*).

166. THE SMALL YELLOW WAVE.—The antennæ are simple in both sexes: the wings are rich fulvous-yellow, with zigzag transverse lines, which are a darker tint of the same fulvous colour; these zigzag lines are arranged in pairs, but not very distinctly so: there are four pairs on the fore wings, and two pairs on the hind wings; and between the second and third pair of these zigzag lines on the fore wings, is a conspicuous central dot of the same colour as the lines: the head, thorax, and body, of the same colour as the ground-colour of the wings.

The MOTH appears on the wing at Midsummer, and has been taken occasionally in nearly all the English counties, but I think neither in Scotland nor Ireland. (The scientific name is *Asthena luteata.*)



167. The Small White Wave (*Asthena candidata*).

167. THE SMALL WHITE WAVE.—The antennæ are simple in both sexes: the wings are white, with seven waved transverse gray lines on the fore wings, and four on the hind wings: there is also a spot between the third and fourth lines on the fore wings, and the fourth and fifth lines are nearer together than either of the others, especially as they approach the inner margin: on the hind margins of all the wings is a series of black dots: the antennæ, head, thorax, and body are pure white.

The MOTH appears on the wing in May and June, and is common everywhere. (The scientific name is *Asthena candidata.*)



168. The Waved Carpet (*Asthena sylvata*).

168. THE WAVED CARPET.—The antennæ are simple in both sexes: the wings are pale gray, with zigzag lines of a darker gray; there are ten of these gray lines on the fore wings, and four on the hind wings: the space on the four wings, between the fifth and sixth of these lines, is greater than the other interspaces, and has the appearance of a pale, transverse band: the last of these lines, situated on the hind margin, consists of a series of long spots, and is not zigzag, but follows the curved outline of the wing, the head, thorax, and body being of the same colour.

The MOTH appears on the wing in June, and is very generally distributed in England, and occurs in Ireland, in the counties Wicklow and Galway. (The scientific name is *Asthena sylvata.*)



169. Blomer's Rivulet (*Asthena pulchraria*).

169. BLOMER'S RIVULET.—The wings are pale gray, the fore wings with two waved raw-sienna bands near the tip, and very close together; the inner of these is bounded by a black waved line; on the costal margin are four or five short, oblique, brown lines, and on the hind margin is a row of long black spots, following the curved outline of the wing: the hind wings have a similar row of spots on their hind margin: both fore and hind wings have a number of beautifully delicate, but obscure, transverse, zigzag markings.

The MOTH appears on the wing in June, and has been taken in the counties of Devon, Somerset, Glamorgan, Gloucester, Worcester, Stafford, Derby, Lancashire, Yorkshire, and Durham. (The scientifie name is *Asthena pulchraria.*)



170. The Dingy Shell (*Eupisteria heparata*).

170. THE DINGY SHELL.—The antennæ are very slightly ciliated in the male, simple in the female: the wings are dingy yellow towards the body, dingy brown towards the hind margin; the two colours are not marked by any line of separation, but are blended into each other: the paler part is marked by three, four, or five transverse waved lines, which are often very indistinct, and are scarcely darker than the general colour of the wing: the antennæ, together with the head, thorax, and body, are of the same colour as the paler part of the wings.

The MOTH appears in June, and is common in most of our English counties, but I think does not occur in Scotland or Ireland. (The scientific name is *Eupisteria heparata.*)



171. The Welsh Wave (*Venusia cambricaria*).

171. THE WELSH WAVE.—The antennæ are ciliated in the male, simple in the female; the wings are pale gray: the fore wings have ten zigzag, brown, transverse lines, which differ much in darkness of shade; near the middle of the wing there is a delicate black crescent-shaped mark: on the hind wings, the markings are few and delicate: the head, thorax, and body are dark gray.

The EGGS are laid about the 17th of July, and the young CATERPILLARS emerge about the 27th. They feed on mountain ash or rowan tree (*Pyrus aucuparia*), and when full-fed spin together a division of the leaf of the food-plant, and change to a CHRYSALIS.

The MOTH appears on the wing about Midsummer, and it is said to have occurred in Monmouthshire, but is chiefly an inhabitant of the northern English counties, Cheshire, Lancashire, the Lake District, Yorkshire, and Northumberland. Mr. Birchall took it at Powerscourt, in Ireland. (The scientific name is *Venusia cambricaria*.)



172. The Bright Wave (*Acidalia ochrata*).

172. THE BRIGHT WAVE.—The antennæ are simple in both sexes: the wings are dingy fulvous; the four wings have four transverse lines of a darker hue, and the hind wings have two; these markings are only a shade darker than the general hue of the wing, and are not all of the same hue, the two nearest the middle of the wing being obviously darker than the rest: the head, thorax, and body are of the same colour as the wings.

This MOTH appears on the wing in June: it is only found on the coasts of Kent and Essex. (The scientific name is *Acidalia ochrata*.)



173. The Tawny Wave (*Acidalia rubricata*).

173. THE TAWNY WAVE.—The antennæ are ciliated in the male, simple in the female: the wings vary in colour, some specimens being of a grayish green, others of a bright purple; but in both instances there are three tranversely oblique darker lines on the fore wings and two on the hind wings.

The MOTH appears on the wing in June, and has only been taken in Surrey, Essex, Norfolk, and Yorkshire. (The scientific name is *Acidalia rubricata*).



174. The Single-dotted Wave (*Acidalia scutulata*).

174. THE SINGLE-DOTTED WAVE.—All the wings are pale wainscot-brown; the fore wings having two waved and interrupted brown lines near to, and parallel with, the hind margin: the costal extremity of the first of these lines consists of a few black dots, that of the second is indistinct, but near the inner margin they become broad and distinct, almost forming a blotch; near the centre of the wing is a dark brown dot, and near the base are several obscure brown markings: the hind wings have a central dark spot, like the fore wings, and three or four very interrupted, waved, transverse lines: there is also a row of about eight dark brown spots at the base of the fringe on each wing: the head, thorax, and body are of the same colour as the wings.

The CATERPILLAR is long, slender, and tapers towards the head; its colour is a pale drab, with a darker medio-dorsal stripe and a paler,

almost white, lateral line. It feeds on the flowers of the burnet saxifrage (*Pimpinella Saxifraga*), and wild chervil (*Anthriscus sylvestris*).

The MOTH appears on the wing in June, and is generally distributed in England, Scotland, and Ireland. (The scientific name is *Acidalia scutulata.*)



175. The Small Fan-footed Wave (*Acidalia bisetata*).

175. THE SMALL FAN-FOOTED WAVE.—All the wings are pale, dingy wainscot-brown; the fore wings have two darker transverse waved lines near to, and parallel with, the hind margin: a dark central spot, and an indistinct transverse darker line just outside the spot: the hind wings have three or four darker transverse lines, parallel to the hind margin; a central dark spot, and an indistinct transverse darker line just within the spot; there are a few small and inconspicuous dots at the base of the fringe, round all the wings: the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in June, and is of frequent occurrence in England, Scotland, and Ireland. (The scientific name is *Acidalia bisetata*).



176. The Treble Brown Spot (*Acidalia trigeminata*).

176. THE TREBLE BROWN SPOT.—All the wings are very pale wainscot-brown, approaching to yellow; the costal margin of the fore wings having a dark mark at the base, extending about a third of its length; a tranverse line crosses the wing at the end of this dark mark, and a second transverse line, parallel to the first, crosses the middle of the wing; outside this second line is a black central spot; beyond the spot is a broad double waved bar, parallel with the hind margin of the wing: the hind wings very nearly resemble the fore wings in the number and situation of their markings, except that there is no dark mark on the costal margin: the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in July, and has occurred in Devonshire, Hampshire, Sussex, Surrey, Berkshire, Suffolk, Gloucestershire, and Worcestershire; and Mr. Birchall has taken it in the county Galway, in Ireland. (The scientific name is *Acidalia trigeminata.*)



177. Greening's Wave (*Acidalia contiguaria*).

177. GREENING'S WAVE.—The antennæ are simple in both sexes: the wings are pale gray, with three distinct waved dark lines at equal distances; the second of these is preceded by an elongate discoidal spot; the hind margin is frequently clouded, and contains a series of dark spots disposed in pairs.

The MOTH appears on the wing in July, and has only been taken in North Wales. (The scientific name is *Acidalia contiguaria.*)



178. The Least Carpet (*Acidalia rusticata*).

178. THE LEAST CARPET.—All the wings are of a whitish ground colour; the fore wings have a central, transverse, brown bar, the outer margin of which is deeply indented; in the middle of this brown bar is a black spot, and between this brown bar and the base of the wing the costal margin is of the same colour; the outer part of the wing, between the bar and the hind margin, is almost white, but is divided into two equal parts by a transverse, zigzag, pale brown, and rather indistinct line: the fringe on the hind margin is spotted with black; the hind wings

have four indistinct and zigzag, pale, waved lines, and a very distinct black dot between the first and second, counting from the base of the wing: the head and thorax are brown —of the same hue as the bar on the fore wings; the body is variegated with the two colours, white and brown.

The MOTH appears in July, and is very abundant in all the hedges about Darent Wood, in Kent; it is also said to have occurred in the Isle of Portland. (The scientific name is *Acidalia rusticata.*)



179. The Dark Cream Wave (*Acidalia interjectaria*).

179. THE DARK CREAM WAVE.—All the wings are very pale wainscot-brown, somewhat approaching to a yellow-ochre tinge; the fore wings have the costal margin shaded with brown, and five pale, transverse, zigzag lines, between the second and third of which is a central black spot; the two lines between this spot and the base of the wing approach each other very nearly in the middle, and I have one specimen in which they are absolutely united: the hind wings have four of these pale, waved, transverse lines, and a black spot between the second and third, counting from the base of the wing; along the hind margin of all the wings is a row of linear, dark brown spots, perhaps better described as a series of short dark brown lines; arranged end to end, and alternating with these lines, is a series of dots in the fringe; these dots, however, are not constant, and are only to be detected in very fine and fresh specimens: the head, thorax, and body are pale wainscot-brown, exactly of the same colour as the wings.

The MOTH appears on the wing about Midsummer, and has been taken in Devonshire, Gloucestershire, Buckinghamshire, Cambridgeshire, and Cheshire. (The scientific name is *Acidalia interjectaria.*)



180. The Silky Wave (*Acidalia holosericata*).

180. THE SILKY WAVE.—All the wings pale wainscot brown, somewhat approaching to yellow-ochre; the fore wings are sprinkled along the margin with extremely minute, dark brown dots, and have five transverse and rather waved lines, of a darker hue than the ground colour of the wing; the hind wings have the same number of waved lines as the fore wings, which, in all respects, they closely resemble: the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in July, and has been taken in Surrey, Gloucestershire, and Worcestershire, but not in Ireland. (The scientific name is *Acidalia holosericata.*)



181. The Small Dusty Wave (*Acidalia incanaria*).

181. THE SMALL DUSTY WAVE.—All the wings are dingy white, sprinkled all over with minute black dots; the black dots are somewhat symmetrically arranged, forming several smoke-coloured, transverse, waved, and very indistinct lines; each of the four wings has also a central black spot: along the hind margin of all the wings is a series of short, dark, smoke-coloured lines, placed end to end, and alternating with these is a row of dark dots in the fringe: the head, thorax, and body are almost white, but, like the wings, sprinkled with minute dark specks.

The MOTH appears on the wing in July, and occurs in all our English counties, and in some places in Scotland. Mr. Birchall says it is common in Ireland. (The scientific name is *Acidalia incanaria.*)



182. The Circellate (*Acidalia circellata*).

182. THE CIRCELLATE.—The antennæ are simple in both sexes; all the wings are ample, and of a pale gray colour, with a silky gloss; the fore wings have two narrow transverse lines; the first is bent towards the base of the wing before it reaches the costa; the second is oblique and waved, and is situated beyond the middle of the wing; between the two transverse lines is a linear discoidal spot, in a faint linear shade; this linear shade is continued across the hind wings, and beyond this is a very distinct, but irregular, dark line; there is a very small discoidal spot in the centre of the wing; round the hind margin of all the wings is a series of very distinct black spots.

This delicate and beautiful little MOTH appears on the wing in June, and has only been taken in one English locality that I am aware of; there is no Scotch or Irish locality recorded. (The scientific name is *Acidalia circellata*.)



183. The Lace Border (*Acidalia ornata*).

183. THE LACE BORDER.—All the wings are silvery white, with an exquisitely beautiful broad border parallel to the hind margin: the border consists of, first, a delicate, black, zigzag line: beyond this are two waved, broader, and less distinct lines, somewhat smoke-coloured, but having a gloss like mother-of-pearl; the first of these broad lines includes two brownish blotches, the first blotch rather above the middle, the second on the inner margin: these lines do not quite reach the costal margin; the outer one is the shorter of the two; on the extreme hind margin of all the wings is a series of short, blackish lines, placed end to end, and beyond these the fringe is alternately brown and white: between the border and the base of the fore wings is a pale brown transverse line; and again, half-way between this and the base, is a row of black dots, three, four, or five, arranged transversely: the hind wings have a very pale, central, transverse line, and a black dot in the middle of it: the head, thorax, and body are silvery white.

The MOTH appears on the wing in June and August, and is very abundant on chalky soils in England, but has not been reported from Scotland or Ireland. (The scientific name is *Acidalia ornata*.)



184. The Mullein Wave (*Acidalia promutata*).

184. THE MULLEIN WAVE.—All the wings are gray, tinged with ochreous yellow, and sprinkled all over with minute black specks: the fore wings have four transverse markings, the first of which is a tolerably distinct line near the base: this line is often broken up and divided into spots: the second is a very indistinct and cloudy bar, having a black spot in the middle: the third is a zigzag, dark line parallel with the hind border; and the fourth is an obscure and interrupted cloudy band: on the extreme hind margin is a row of very distinct, short, black lines placed end to end, and the fringe is sprinkled with black dots: the hind wings are very similar to the fore wings, and the head, thorax, and body are of the same colour as the wings.

The MOTH appears on the wing in June and July, and has occurred rather freely in the south-western counties of England, but I think not in the eastern counties; it is reported from Radnorshire, Cheshire, Lancashire, and Northumberland, but not from Scotland. As regards Ireland, Mr. Birchall reports it from

the counties of Cork and Kerry and that it is common at Howth and Malahide. (The scientific name is *Acidalia promutata.*)



185. The Dotted-bordered Cream Wave (*Acidalia straminata*).

185. THE DOTTED-BORDERED CREAM WAVE.—The wings are very pale testaceous-brown, with a very small, intensely black discoidal spot; between this discoidal spot and the base of the wing are several transverse lines, one of them more conspicuous than the rest; beyond the discoidal spot are three waved transverse lines, and on the margin itself is a series of rather elongate but very distinct black spots.

The MOTH appears on the wing in June, and has been taken in Dorsetshire, Hampshire, Surrey, and Buckinghamshire; but is not recorded from Scotland or Ireland. (The scientific name is *Acidalia straminata.*)



186. The Satin Wave (*Acidalia subsericata*).

186. THE SATIN WAVE.—All the wings are whitish-gray; the fore wings having five, and the hind wings four, narrow, transverse, slightly-waved lines, only a shade darker than the ground-colour: between the first and second of these is a central dot on the fore wings, and there is a very slight indication of the same on the hind wings: there are no dark lines on the hind margin of the wings, but there are a few black dots in the fringe: the head, thorax, and body are of the same colour as the wings: the fore legs are remarkably long and dark coloured.

The MOTH appears on the wing in June, and has been taken abundantly in the south-western and southern counties of England, also in Gloucestershire, Worcestershire, Lancashire, Cheshire, and the Lake District. Mr. Birchall says it is common at Howth, in Ireland. (The scientific name is *Acidalia subsericata.*)



187. The Lesser Cream Wave (*Acidalia immutata*).

187. THE LESSER CREAM WAVE.—All the wings are ochreous gray, speckled with minute black dots: the fore wings have five, and the hind wings four, transverse, waved lines, only a shade darker than the ground-colour of the wing: in the centre of each wing is a conspicuous black dot: head, thorax, and body of the same colour as the wings.

The MOTH appears on the wing in June, and has occurred in Devonshire, Somersetshire, Dorsetshire, the Isle of Wight, Surrey, Norfolk, Suffolk, Cambridgeshire, Cheshire, Lancashire, and the Lake District. Mr. Birchall says it is common at Killarney. (The scientific name is *Acidalia immutata.*)



188. The Cream Wave (*Acidalia remutata*).

188. THE CREAM WAVE.—All the wings are pale, dingy, wainscot-brown, speckled very sparingly with black dots: the fore wings have four and the hind wings three waved lines, slightly darker than the ground-colour, and the hind wings have a black spot in the centre: the head, thorax, and body are of the same dingy hue as the wings.

The MOTH appears on the wing in May, and has occurred in nearly all our English and Scotch counties; and Mr. Birchall says it has been taken at Killarney, and in the county Wicklow in Ireland. (The scientific name is *Acidalia remutata.*)



189. The Smoky Wave (*Acidalia fumata*).

189. THE SMOKY WAVE.—The antennæ are quite simple in the female; almost so in the male; the very short pubescence being imperceptible to the naked eye. All the wings of the male are smoky gray, sprinkled over with darker dots. There are four very indistinct transverse bars on the fore wings, and three on the hind wings; but they can scarcely be perceived unless in fresh and perfect specimens. There is no central dot on either of the wings. The female is less than the male; the wings paler gray, without any tinge of smoke colour. The face is dark brown; the crown of the head gray; the thorax and body gray, with dark or almost black dots; the fringe is dotted in the same manner as the wings.

The CATERPILLAR has the head and body about equal in width; the head broadly but very indistinctly notched on the crown; the body extremely slender, notwithstanding the presence of a dilated lateral skinfold; the twelfth segment is slightly elevated; the segments are transversely wrinkled, and divided by the wrinkles into fourteen or sixteen extremely narrow but distinct sections. Colour of the head wainscot-brown, with four longitudinal darker marks, which are continuous with dorsal stripes on the body; body pale wainscot-brown, with a medio-dorsal darker stripe, which increases in intensity at the divisions of the segments, and still more at the anal extremity; it is traversed throughout by a threadlike paler stripe; between this medio-dorsal stripe and the spiracles is a rather paler stripe, also intersected by a paler threadlike stripe; the skinfold is paler than the dorsal area, and below the skinfold is a darker stripe, which becomes more intense towards the anal extremity, and terminates in the ventral claspers; the ventral area is very pale, except between the ventral and anal claspers; the spiracles are black, and there is a black dot below the second, third, and fourth spiracles; the feet are very pale; the claspers darker, but having a pale external area. It feeds on heath.

The MOTH flies about midsummer; it is extremely common on heaths in the west of Scotland, occurs in the north of England, but I have not seen a southern specimen. It is widely distributed in Ireland. (The scientific name is *Acidalia fumata.*)



190. The Subangled Wave (*Acidalia prataria*).

190. THE SUBANGLED WAVE.—The antennæ of the male are slightly pectinated; the pectinations very short; those of the female are simple: the fore wings are simple; the hind wings slightly angulated: all the wings of yellowish gray, sprinkled with black dots, and having several indistinct darker transverse lines on all the wings; there is a black dot between the first and second of these lines on the fore wings; the first line is short, slightly waved, oblique, and very indistinct; the second is more distinct and broader: this is continuous with the first line on the hind wings, thus passing on the outside of the black central spot on the fore wings, and on the inside of the black central spot on the hind wings: the third line on the fore wings is narrower and more waved than the second; it is continuous with the second line on the hind wings; beyond this third line is a fourth, exactly of the same form but of lighter shade; on the hind margin itself is a very delicate but distinct dark line.

The CATERPILLAR is of an ochreous-gray ground-colour, with a darker gray medio-dorsal stripe, and a paler, almost white, stripe on each side in the region of the spiracles, some of which it includes. It feeds on the hedge woundwort (*Stachys sylvatica*), and may be found during April and May.

The MOTH appears on the wing at midsummer, and is almost confined to the neighbourhood of Folkestone, on our south coast. It has not been found in Scotland or Ireland. (The scientific name is *Acidalia prataria.*)



191. The Small Blood-vein (*Acidalia imitaria*).

191. THE SMALL BLOOD-VEIN.—The antennæ of the male are very slightly fringed; of the female quite simple; the fore wings are pointed, the hind wings sharply angled; all the wings clay-coloured, with a broad oblique brown band continued across both the fore and hind wings; this band passes outside a central brown dot on the fore wings, and inside a central brown dot on the hind wings; between this oblique band and the hind margin, there is a delicate transverse waved line of the same colour, and a similar line, as regards delicacy and colour, on the hind margin itself, and just within the fringe.

The Rev. H. Burney has found the CATERPILLAR of this moth on broom; it is very long and very slender, quite threadlike, with white marks down the back: he found, however, that it would not eat broom, and at last fed it on sorrel (*Rumex acetosella*): it spun up at the end of June, and turned to a yellowish-brown CHRYSALIS.

The MOTH came out on the 14th of August: it is not uncommon in the south of England, and occurs occasionally as far north as York, and in two Irish counties, Cork and Kerry, but has not been found in Scotland. (The scientific name is *Acidalia imitaria.*)



192. The Rosy Wave (*Acidalia emutaria*).

192. THE ROSY WAVE—The antennæ are almost simple in both sexes; all the wings are yellowish-white, with a delicate rosy tinge of mother-of-pearl, and each having an obscure central dot; there is an oblique line from the tip of the fore wing to the middle of its inner margin; and a second equally faint and obscure line halfway between this and the base; besides these there are three very oblique series of small dark spots on the fore wings, and two on the hind wings. The first of these series on the fore wings is generally composed of three spots, the second of seven or eight spots, and the third, also composed of seven or eight spots, is on the hind margin, and in very fine and fresh specimens these marginal spots are connected together by an extremely delicate line; on the hind wings the first series of spots is generally composed of eight spots, and crosses the middle of the wing in a straight line; on the margin itself is a double series of elongated markings, connected by a threadlike line; the face is dark brown, the collar paler brown, the crown of the head, thorax, and body delicate whitish-gray.

The MOTH appears about the middle of summer, and is found in the Isle of Dogs and at Woolwich, close to the banks of the Thames. (The scientific name is *Acidalia emutaria.*)



193. The Riband Wave (*Acidalia aversata*; variety, *remutata*).

193. THE RIBAND WAVE.—The antennæ of the male are very slightly pubescent, those of the female quite simple. All the wings are of a pale dingy yellowish-gray, the fore wings having three transverse lines and the hind wings two; just inside the second of these lines on the fore wings is a central very small brown spot; on the hind wings is a similar spot, generally situated on the first transverse line, but this situation is not constant; it is sometimes inside and sometimes outside of the first line; the entire space between the second and third lines on the fore wings, and between the first and second lines



The Riband Wave (variety, *aversata*)

on the hind wings, is not unfrequently entirely filled up by dark brown, and when this is the case the lines themselves are scarcely visible, but a broad brown band or riband crosses the middle of all the wings. This is the true "riband wave." When this band or riband is present there is generally also a waved, narrow, and rather indistinct band between it and the hind margin; the hind margin itself has a delicate brown line, interrupted only by the wing-rays; the fringes of all the wings are of the same ground colour as the wings themselves, but at the end of each wing-ray is a round brown dot in the fringe.

The CATERPILLAR is rough, rather like shagreen, being divided transversely into narrow sections of segments, and these being composed of minute warts; its ground colour is dark brown, except towards the anal extremity, which is ochreous-gray; on each side in the region of the spiracles is a pale, almost white line: it feeds on a great number of hedgerow plants, as water avens, common avens (*Geum rivale* and *G. urbanum*), meadow sweet (*Spiræa ulmaria*), &c.

The MOTH appears about midsummer, and is very common in England, Scotland, and Ireland. (The scientific name is *Acidalia aversata.*)



194. The Plain Wave (*Acidalia inornata*).

194. THE PLAIN WAVE.—The antennæ of the male are very slightly pubescent, those of the female quite simple. All the wings are of a pale dingy yellowish gray with a slightly iridescent gloss something like mother-of-pearl; the fore wings having generally five transverse waved lines, and the hind wings four; all these are very pale, although darker than the ground colour of the wing: on the fore wings there is a central brown spot on the second line; on the hind wings there is a similar central spot on or just below the first line; the hind margin itself has a delicate brown line interrupted only at the wing-rays; the space between the outer transverse line and the hind margin on all the wings is frequently intersected by one or two paler waved transverse lines; the fringe is unspotted.

The CATERPILLAR rests in a straight posture, and does not fall off its food when touched or disturbed; the head looks downward, and not forward; the body is rather flattened, and spread out at the sides; the divisions of the segments are very clearly marked, and each segment is divided by transverse furrows into eight rings; these rings in the second, third, fourth, ninth, and following segments are composed of warts which emit short stumpy bristles; the colour is red-brown, with little variation of shade, but having a whitish median spot on the back of the sixth and seventh segments. This caterpillar feeds on several low plants, and also on low shoots of willow; it is full fed at the end of May; and then spins a slight web among the leaves of its food plant, and therein changes to a CHRYSALIS.

The MOTH appears about midsummer: it is not common, but has been taken in several of the English counties, and at Kingstown and Killarney, in Ireland, but not in Scotland. (The scientific name is *Acidalia inornata.*)



195. The Portland Riband Wave (*Acidalia degeneraria*).

195. THE PORTLAND RIBAND WAVE.—Antennæ simple in both sexes. Fore wings slightly hooked: all the wings pale yellowish-gray, the fore wings having a reddish costal margin and a broad transverse brown band situated rather before the middle of the wing; in this band is a central brown spot; half way between this band and the hind margin are two transverse waved lines very near together, the inner being rather darker than the outer; the hind margin itself has a delicate dark line: hind wings with the basal

portion rather darker, and outside of this basal darker part is a central black spot; between the spot and the hind margin are three transverse waved lines, the darkest inside, the lightest outside. The crown of the head is almost white; the thorax and body are of the same colour as the wings.

The MOTH is taken in July in the Isle of Portland, and, I believe, nowhere else in England, Scotland, or Ireland. (The scientific name is *Acidalia degeneraria.*)



196. The Small Scallop (*Acidalia emarginata*).

196. THE SMALL SCALLOP.—The antennæ are nearly simple in both sexes. Fore wings with a double toothlike projection in the middle of the hind margin: hind wings distinctly angulated, the angle being double. All the wings slightly scalloped, ochreous-yellow, and each having a central brown spot; the fore wings have three narrow transverse lines, one on each side of the central spot, and the third on the hind margin: the hind wings have two narrow transverse lines, the first outside the central spot, and the second on the hind margin: the head, thorax and body are of the same ochreous-yellow colour as the wings.

This MOTH is not abundant: it is occasionally taken in nearly all the English counties about midsummer, but has not been found in Scotland or Ireland. (The scientific name is *Acidalia emarginata.*)



197. The Blood-Vein (*Timandra amataria*).

197. THE BLOOD-VEIN. The antennæ of the male are strongly pectinated; those of the female simple, the fore wings are pointed, the hind wings angled; all the wings of an olive-gray colour, thickly sprinkled with darker spots, and having a beautiful oblique red stripe commencing at the tip of the fore wings, and ending at the middle of the inner margin of the hind wings. The fore wings have a transverse central spot, and a slender dark waved line, commencing at the tip of the wing side by side with the red stripe, and ending on the inner margin, half way between the red stripe and the anal angle; a similar line on the hind wings meets this one on the fore wings and crosses the hind wing half way between the red stripe and the hind margin; the hind margins of all the wings are beautifully rose-coloured, the rose colour falling gradually into the olive gray; head, thorax, and body gray.

The CATERPILLAR is dingy smoke-colour, with a medio-dorsal stripe almost white; between this and the spiracles is another whitish stripe on each side, but this is less perfect than the medio-dorsal stripe. It feeds on several kinds of dock, sorrel, and knot grass, and frequently swarms in fields of buckwheat.

The MOTH, which is extremely beautiful, is common about midsummer in most of the English counties, and in Ireland has been taken in Galway and Kerry. (The scientific name is *Timandra amataria.*)



198. The Common White Wave (*Cabera pusaria*), male.

198. THE COMMON WHITE WAVE.—The antennæ are pectinated in the male, simple in the female. All the wings rounded white, sprinkled with gray dots; the fore wings have three oblique, transverse, gray lines, the hind wings two; the second and third of these lines are frequently nearer together than the first and second. A variety occasionally occurs, in which the second and third lines are united and appear as one, so that the fore wings have only two transverse lines. The shaft of the antennæ, the head, thorax, and body are pure white.

The CATERPILLAR rests in a nearly straight posture, with the head porrected on the same plane as the body; head flattened, quite as broad as, and in young specimens rather broader than, the body; body uniformly cylindrical, without humps. Colour infinitely varied; one variety is uniformly brown, with



Common White Wave, female.

a pair of white dots on the back of each segment; another variety is green, with a medio-dorsal row of brown spots, each spot situated between two segments, and the anterior ones having a small white spot on each side; each segment has also four black spots on its under surface. It feeds on oak, birch, hazel, and many other trees; it is full-fed in September, when it spins a loose cocoon on the surface of the earth.

The MOTH comes out in June, and is on the wing throughout July and August: it is common every where in England and Ireland. (The scientific name is *Cabera pusaria.*)



199. The Round-winged White Wave, males and females.

199. THE ROUND-WINGED WHITE WAVE.—The antennæ are pectinated in the male, simple in the female. All the wings are rounded, white sprinkled with gray dots; the fore wings have three oblique transverse gray lines, and the hind wings two; the second line on the fore wings is very indistinct and often wanting.

The MOTH appears on the wing in May in the south of England; but is not reported from Scotland or Ireland. (The scientific name is *Cabera rotundaria.*)



200. The Common Wave (*Cabera exanthemaria*).

200. THE COMMON WAVE.—The antennæ of the male are pectinated, those of the female simple. All the wings are dingy yellowish-gray; the fore wings having three, the hind wings two, indistinct transverse darker lines, and sprinkled all over with still darker dots. The antennæ are white, with black rings towards the tip; the thorax and body are gray.

The CATERPILLAR is of an uniform yellow-green colour, rather more slender towards the head; it feeds on sallow and alder, and is full-fed in the autumn, when it falls to the ground and makes a slight cocoon under fallen leaves, and remains in the CHRYSALIS state during winter.

The MOTH is very common, and is on the wing during a considerable portion of the summer in most of the English and Irish counties. (The scientific name is *Cabera exanthemaria.*)



201. The Clouded Silver (*Corycia temerata*).

201. THE CLOUDED SILVER.—The antennæ are simple in both sexes. All the wings are rounded and white; fore wings with a central dark brown spot, a waved and somewhat undefined transverse band half way between the central spot and the hind margin; a row of very dark crescent-shaped markings on the hind margin, and the centre of the space between this row and the transverse band is occupied by a dark smoke-coloured cloud; these together constitute a conspicuous and distinguishing blotch; there is also about the middle of the inner margin a transversely

elongated mark of the same colour; the hind wings have two faintly indicated waved lines parallel with the hind margin, and a series of slender dark markings on the margin itself; head, thorax, and body white.

The female, who has a long ovipositor, well adapted for the purpose, deposits her eggs in May and June, either in the crevices of the bark or the axils of the leaves of the younger shoots both of the blackthorn and the bird-cherry.

The young CATERPILLARS emerge in about fourteen days, and are at first of a deep yellow colour; they soon change to green, and oftentimes assume a broad medio-dorsal stripe of pale yellow, which, after the last moult, changes as described below. The caterpillar is full-fed at the end of July, when it rests in a nearly straight position, with the head porrected on a plane with the body. Head flat, narrower than the second segment, not notched on the crown; body smooth, velvety, uniformly cylindrical. Colour of the head pale green, semi-transparent, with a large pear-shaped spot on each cheek, the smaller extremity of which approaches the mouth, the larger extremity the crown; this spot is orange-red in the centre, and black on the margin; dorsal surface of the body grass-green, with a medio-dorsal series of elongate orange spots, which occur at the interstices of the segments, and are continuous only on the third and twelfth segments; these spots are bordered on both sides with rich brown; the second and thirteenth segments are not thus decorated; the dorsal surface is also sparingly dotted with glaucous-green, approaching to white; on the sides are a series of spiracle-like black dots, the spiracles themselves being brown, and each surrounded by a glaucous ring; the ventral surface is pale glaucous; the legs pale transparent green; the claspers grass-green, with pink extremities; it spins a slight cocoon, and remains in the CHRYSALIS state throughout the winter and until the following May, when the MOTH emerges. It is not uncommon in England, and is abundant at Killarney, in Ireland. (The scientific name is *Corycia temerata.*)



202. The White-pinion Spotted (*Corycia taminata*)

202. THE WHITE-PINION SPOTTED.—The antennæ are simple in both sexes; all the wings are white, the fore wings having two brown and obscurely triangular markings on the costal margin; the first of these is situated at rather more than a third of the distance between the base and the tip of the wing, and the second is just half way between the first and the tip: the head, thorax, and body are white.

The CATERPILLAR is green or purplish brown; it has a broad purple stripe down the middle of the back, edged with white: the spiracular line white, the spiracles black. It feeds on wild cherry.

The MOTH occurs, but not commonly, in May, in the south of England, more rarely in the north. Mr. Birchall says it is abundant in Ireland. (The scientific name is *Corycia taminata.*)



203. The Sloe Carpet (*Aleucis pictaria*).

203. THE SLOE CARPET.—The antennæ are simple in both sexes; the fore wings are smoke-coloured, with two transverse waved darker lines, and a central transversely elongated spot of the same colour, exactly midway between them; the hind wings are paler, with a very indistinct waved line across the middle; head, thorax, and body gray.

Mr. Stainton has most obligingly handed me the following description of the CATERPILLAR, written by Mr. E. G. Baldwin: "Brownish gray, more or less marbled with whitish, particularly on the eighth and ninth segments; a faint, blackish, V-like mark on the back of the fifth, sixth, seventh, and eighth segments, and a black transverse line on the twelfth segment;

a short, oblique, lateral, black streak on the third and fourth segments; a black spot on the side of the sixth, seventh, eighth, and ninth segments, above the whitish spiracles." It feeds on the leaves of the sloe.

This MOTH was originally discovered in abundance near Colchester, and for many years subsequently it was unobserved until again discovered on Dartford Heath, flying about the sloe when in blossom; it has since been found in Epping Forest, also frequenting the flowers of the sloe, but has not been reported from the middle or north of England, from Scotland, or from Ireland. (The scientific name is *Aleucis pictaria.*)



204. The Sharp-angled Peacock (*Macaria alternata*).

204. THE SHARP-ANGLED PEACOCK.—The antennæ are simple in both sexes; the fore wings angled, and having a deep semicircular notch just below the tip; hind wings angled. All the wings are gray, sprinkled with numerous minute short transverse streaks rather darker than the ground colour of the wing, but still extremely pale and indistinct. The fore wings have a short curved transverse line near the base, and a second at a short distance suffused and often indistinct, and beyond this a third, always accompanied by a broad transverse band, which, although pale, is slightly darker than the ground colour of the wing; the costal extremity of this band is conspicuously darker, and it also contains a dark blotch near the middle; the crescentic notch on the hind margin is strongly bordered with brown; the hind wings have two broad transverse bands corresponding with those on the fore wings, and between them is a dark central spot. The head and neck are brown, the thorax and body gray, the latter is sprinkled with dark dots, and has two conspicuous brown spots on the base of each segment.

The CATERPILLAR is light green, and ornamented with three triangular reddish-brown marks on the sides of the middle segments; it changes to uniform reddish-brown before entering the ground; the legs and claspers are reddish-brown. It feeds on sallow.

The MOTH is apparently rare, occurring only in the south-west of England, in July, and not having been found to my knowledge in Scotland, Wales, or Ireland. (The scientific name is *Macaria alternata*



205. The Peacock (*Macaria notata*).

205. THE PEACOCK.—The antennæ are simple in both sexes; the fore wings are angled and have a deep semicircular notch just below the tip on the hind margin; hind wings angled; all the wings gray, sprinkled with numerous minute short transverse streaks rather darker than the ground colour of the wing, but still extremely pale and indistinct; they have also three transverse lines of the same colour as these little streaks, the first short, curved, and very near the base of the wing; the second rather longer, curved in the same direction, and just beyond the first; the third is rather beyond the middle of the wing; each of these transverse lines terminates in a dark spot on the costal margin; between this and the outer margin are two very conspicuous dark blotches, one of them is on the costal margin, and is just outside of the third transverse line, the other is below this, and is about equidistant from the costal, hind, and inner margins; it is darker than the costal blotch, and is composed of five smaller spots crowded closely together; the third transverse line seems almost to pass through this blotch; the hind margin itself is strongly marked with dark brown, especially in the semicircular notch already described; the hind wings have two transverse lines which correspond with the second and third on the fore wings, and between them is a dark central dot; the hind margin itself is delicately edged with rich dark brown just within the fringe. The head is

brown, the thorax gray, the body gray with numerous brown dots, and two conspicuous brown spots on the back of each segment.

The CATERPILLAR feeds on sallow (*Salix caprœa*); it is olive-green on the back, with a medio-dorsal series of ochreous-brown spots; the sides are of the same ochreous-brown colour as the dorsal spots: it is to be found in September.

The MOTH appears in the following June, and occurs in several southern counties of England, and also in Ireland. (The scientific name is *Macaria notata.*)



206. The Tawny-barred Angle (*Macaria liturata*).

206. THE TAWNY-BARRED ANGLE.—The antennæ are very slightly pubescent in the male, quite simple in the female; the hind wings are angled; all the wings are ochreous-gray, with a broad but indistinct band suffused with orange-yellow near and parallel to the hind margin; the gray portions of the wing are delicately dotted with dark brown; the fore wings have several very distinct brown spots on the costal margin; from three of these, more conspicuous than the rest, three waved brown lines cross the wing, terminating on the inner margin, the third borders the orange-tinged band I have already described; hind wings with two waved transverse pale brown lines, and a central brown spot between them. Head and neck yellow-brown, thorax and body sprinkled with brown.

The CATERPILLAR feeds in fir-woods on the needles of the firs; it has a brown head and green body, with five whitish stripes, the medio-dorsal stripe, and the next on each side, or subdorsal stripe, are rather dingy white, but the second on each side on the region of the spiracles is almost pure white.

The MOTH appears in July, in several counties of England, Scotland, and Ireland. (The scientific name is *Macaria liturata.*)



207. The V. Moth (*Halia wavaria*).

207. THE V. MOTH.—The antennæ of the male are pectinated, the pectinations short, but very obvious; those of the female simple; the fore wings are simple; the hind wings slightly scalloped; all the wings are gray, tinged with a faint iridescent or purple gloss, the hind margin also suffused with brown: on the costal margin of the fore wings are numerous short transverse streaks, and four conspicuous spots of a dark umber-brown; of these spots the first and third are shortest and smallest, the second is longest, it almost reaches the middle of the wing, and then turns at a right angle towards the base, the fourth is broader but much shorter than the second; on the hind margin is a series of dark black lines almost touching each other, and the middle of each emits a little brush of white fringe; the hind wings have an obscure spot near the centre, and similar markings on the hind margin to those on the fore wing. The body is gray, dotted with brown.

The CATERPILLAR rests in a nearly straight posture, but with the head erected and porrected. When disturbed, it falls from its food bent double, and feigns death, remaining for a long time perfectly without motion; its body is slightly dilated at the sides, otherwise uniformly cylindrical; head lead-coloured, with black markings, the disposition of which differs in different individuals: the colour of the back varies from an obscure apple-green to a decided lead-colour, scarcely two individuals being precisely similar in tint, but all are marked longitudinally with waved interrupted smoke-coloured lines, which are very near together: belly coloured nearly like the back; on the sides each segment is adorned with a canary-coloured blotch: all these together have the appearance of a yellow lateral stripe; on all parts of the body are

shining black warts, each of which emits from the summit a single black bristle; four of these warts are ranged in a transverse series on the back of the second, third, and fourth segments, and four of them in a square on the back of the fifth and following segments, and three in each yellow mark on the side form a triangle which comprises the spiracle; claspers lead-coloured. It feeds on the common gooseberry, and changes to a CHRYSALIS in a slight web attached to some of the leaves.

This MOTH is rather common in our English gardens, and also in Ireland; it flies in July. (The scientific name is *Halia wavaria.*)



208. The Rest-harrow (*Aplasta ononaria*).

208. THE REST-HARROW.—The antennæ of the moth are perfectly simple and setaceous in both sexes; the fore wings are rather pointed; the hind wings rounded, but truncate at the anal angle: the colour of the wings is dull ochre, thickly irrorated with brick-red dots, and having a scarcely perceptible median shade common to them all, and due to the crowding of the dots; the hind wings are rather paler than the fore wings; the under side has the median shade more distinctly marked than the upper side: the sexes are alike.

The CATERPILLAR occurs in April and September on the rest-harrow (*Ononis spinosa*), the only plant on which it has been known to feed: it is extremely sluggish, and never leaves its food-plant: it is short, fusiform, obese, and without tubercles, and is entirely covered with short stiff hairs; its colour is pale dark green, with a darker medio-dorsal stripe, and a paler but indistinct spiracular stripe. When full-fed it spins a cocoon on the surface of the earth amongst moss, and therein undergoes its change to a CHRYSALIS.

The MOTH appears on the wing at the end of May, and again in July and August. It has been taken in the Warren, at Folkestone, in July. (The scientific name is *Aplasta ononaria.*)



209. The Latticed Heath (*Strenia clathrata*).

209. THE LATTICED HEATH.—The antennæ are nearly simple in both sexes. The wings are rounded, and of two colours, smoky-brown and dingy white; the dark colour is arranged in five broad transverse bands on the fore wings, and four on the hind wings; these bands are very irregular, and very different in different individuals; the wing-rays are of the dark colour, and crossing the bands at right angles divide the white portions into a number of squareish white spots, giving to the entire surface of all the wings somewhat the appearance of lattice-work, whence the name; the fringe of all the wings is a most beautiful object, the dark brown colour alternating in square spots with other square spots of a most lovely pearly whiteness; the antennæ are ringed with dark brown and yellowish-white; the head, thorax and body are dark brown sprinkled with yellowish-white; the body having seven slender belts of a pure and delicate white.

We learn from Guenée that the CATERPILLAR has a green head with a white line on the face; the body is rather pale green, with a double white medio-dorsal stripe bordered with darker green; on each side is a similar stripe, and below the spiracles, which are white and delicately bordered with black, is another white stripe bordered above with a line of black dots; ventral surface green, with four white lines. It feeds chiefly on trefoil and saintfoin almost throughout the year, but principally in spring and autumn.

CATERPILLARS that feed on the various species of trefoil and grasses, may be obtained abundantly by using the sweeping net at night.

The MOTH flies in May and June, and is common in clover-fields and on heaths in England and Ireland. (The scientific name is *Strenia clathrata.*)



210. The Brown Silver Line (*Panagra petraria*).

210. The Brown Silver Line.—The antennæ of the male are slightly pectinated, those of the female quite simple; the fore wings are pointed, the hind wings rounded: the colour of the wings is pale wainscot-brown, sprinkled with rather darker brown, and having two transverse darker lines, both of which are bordered on the outer side with a pale and almost silvery line; neither of these double transverse lines quite reaches the costal or inner margin of the wing, but the outer or longer one does so more nearly than the inner or shorter one; between these two lines is an oblong dark central spot, and parallel with the hind margin is a decided indication of a third transverse line, also of two shades, but this is indistinct. The hind wings are very pale, with a slight iridescent gloss as if of mother-of-pearl, with a very faint transverse line across them in the middle, scarcely perceptible except on the inner margin. Head, thorax, and body very pale wainscot-brown.

We learn from Mr. Hellins that the EGGS when laid are straw-coloured, but subsequently become bright red, and afterwards dingy.

The CATERPILLARS, which emerge at the end of May, feed on the common brakes (*Pteris aquilina*). When full-fed their length is rather more than an inch; the ground colour of the back is olive green, of the belly paler; the white body is covered with slender chocolate-brown longitudinal lines arranged in pairs; there is a double medio-dorsal stripe, and three double stripes on each side, the lowest darkest and broadest. The spiracles are black, and below them is a creamy-white stripe.

The MOTH appears on the wing in June in most of the English counties, and in the county Wicklow, in Ireland. (The scientific name is *Panagra petraria*.)



211. The Barred Umber (*Numeria pulveraria*).

211. The Barred Umber.—The antennæ are very strongly pectinated in the male, but simple in the female. All the wings reddish umber-brown, sprinkled with darker brown, the fore wings having a broad transverse central band of rich umber-brown; this band is much broader at the costal than at the inner margin, the narrowing taking place just about the middle. The hind wings have no band, but a faint central transverse line.

Mr. Merryfield has described the general colour of the CATERPILLAR as purplish-brown, varied with ochreous; the head is bifid, light ochreous-brown, especially in front; a brown ochreous stripe, lightest at the upper edge, along the upper part of the side of the fifth segment. On each segment from the fifth (inclusive) backwards, is a pair of very small points, which are light in front and dark behind, besides smaller points just behind the spiracles. A pair of large warts on the back of the ninth segment, a pair much smaller on the back of the tenth and twelfth, and a pair smaller on the back of the eleventh segment. The tenth, eleventh, and twelfth segments have some dark arrow-head lines (not, however, quite meeting in a point) on the back, margined outwardly with ochreous; sides wrinkled, especially in the fore part of the body; belly purplish-brown, with ochreous blotches on each side, the claspers underneath being dark bluish-green, and the space between each pair of claspers yellowish; sometimes a lighter line down the middle of the belly. It feeds on sallow, spinning up among leaves and moss when full-fed.

The MOTH appears on the wing in the spring—April and May. It occurs in some of the English counties, in Ayrshire, in Scotland, and at Powerscourt, in Ireland. (The scientific name is *Numeria pulveraria*.)



212. The Gray Scalloped Bar (*Scodiona belgiaria*), male.

212. THE GRAY SCALLOPED BAR.—The antennæ of the male are strongly pectinated, of the female simple; the wings are simple; in the male all the wings are of a pale whitish-gray; the fore wings have two nearly black scalloped transverse lines, the first crosses the wing in almost a direct line at about one-third of the distance between the base and the tip, the second rather obliquely, and at about two thirds of the distance from the base to the tip. Between these two transverse lines, and equidistant from both, is a transversely oblong spot almost black; outside of the second line, but closely adjoining to it, are two large dark blotches. The hind wings have one scalloped transverse dark line, and a dark spot between this and the base. Head, thorax, and body



The Gray Scalloped Bar, female.

almost white. In the female, which is much smaller than the male, the colour of the wing is much darker, being almost smoke-coloured, but the markings are the same, except that the two blotches outside the second transverse line are scarcely to be perceived.

The EGGS are laid in June on the common ling, on which plant the CATERPILLAR feeds: this caterpillar hybernates very early in the autumn, and begins to feed again the following April; it then grows very rapidly, and is full-fed about the 1st of May. It falls off its food and rolls in a ring when handled or disturbed, and will often remain in this position for an hour without moving. Its shape is uniformly cylindrical, with two small warts placed transversely on the back of each segment. There is a conspicuous conical horn on the twelfth segment, and a pair of slender closely approximate horns pointing backwards on the thirteenth. Its colour is very dull brown, obscurely variegated, mottled and streaked with gray; on the outside of the first pair of claspers is a white stripe, and a faint appearance of a similar stripe on the hinder pair. It spins a slight cocoon on the surface of the ground, and therein changes to a CHRYSALIS, and to a perfect insect at the end of May. During June it flies over heaths in England, Scotland, and Ireland. (The scientific name is *Scodiona belgiaria.*)



213. The Bordered Gray (*Selidosema plumaria*).

213. THE BORDERED GRAY.—The antennæ of the male are very strongly pectinated, quite plumose; those of the female simple; all the wings are plumbeous-gray, and have a broad dark band along the hind margin; the fore wings have two transverse darker bars, the first near the base, and the second near the middle; the female is very much less than the male, but in colour and markings the sexes are very similar. The head, thorax, and body are of the same colour as the wings.



The Bordered Gray, female.

The CATERPILLAR is figured by Hubner as uniformly cylindrical, and without warts, is of a brown colour, variegated with darker spots, and having a very dark medio-dorsal stripe, which grows wide at the posterior margin of each segment, forming a small blotch. It changes to a CHRYSALIS under the surface of the earth.

The MOTH appears in July in the New Forest, Hampshire, in Cheshire, and Lanca-

shire, and about Killarney in Ireland. (The scientific name is *Selidosema plumaria.*)



214. The Netted Mountain Moth (*Fidonia carbonaria*).

214. The Netted Mountain Moth.—The antennæ of the male are pectinated; those of the female simple. All the wings white, freckled with black, the fore wings having four, the hind wings three, zigzag blackish transverse bars; in all the wings the bar nearest the base being very indistinct; a central black spot between the second and third bar is often visible; the extreme hind margin is also black, and the fringe alternately black and white. The head, thorax, and body are nearly black, freckled with pale gray. and the body has also six pale gray rings.

The eggs are laid on birch and sallow, on the leaves of which the caterpillars feed: when these are full fed, which is usually about the middle of July, they rest in a nearly straight position on the leaves, preferring the under surface: if annoyed, they fall from their food-plant, and remain motionless, still retaining a nearly straight position: head subporrect, slightly narrower than the second segment, but never received into it; body uniformly convex above, somewhat dilated at the sides, where it has a very distinct undulated skinfold below the spiracles: it has no prominent humps, but a double series of minute dorsal warts, each of which emits a bristle; there are other bristles on the side below the spiracles: colour of the head dull brown, the face variegated with whitish-brown: body with the dorsal surface dingy wainscot-brown, of two shades, disposed in very obscure waved stripes: spiracles pale, with black rings: minute dorsal warts black: ventral slightly paler than the dorsal surface; a rather broad medio-ventral stripe still paler, and a narrower pale stripe on each side between this and the skinfold: legs and claspers of nearly the same colour as the ventral surface. Changes to a chrysalis on the surface of the earth among dead leaves.

The moth appears on the wing in May, and occurs only in Scotland and Yorkshire. (The scientific name is *Fidonia carbonaria.*)



215. The Common Heath (*Fidonia atomaria*).

215. The Common Heath.—The antennæ of the male are strongly pectinated, those of the female simple; the ground colour of the wings in the male is dingy orange-brown; in the female, which is much smaller, the ground colour of all the wings is white; the fore wings in both sexes are traversed by four transverse brown bands, of which the second and third unite at the inner margin; the hind wings have three equidistant brown bars; the pale spaces between these bands are sprinkled with dark dots; the fringe is alternately brown and pale. The head, thorax, and body are brown, sprinkled with pale scales.

Guenée describes the caterpillar as very various in colour, being either rose-coloured, green, ochre-coloured or brown, with a double medio-dorsal stripe dilated into lozenge-shaped markings; there is also a bright stripe in the region of the spiracles. The head, feet, and claspers are concolorous with the body. It feeds on various plants growing on heaths and downs, as the trefoils, &c.

The moth is very abundant on chalk-downs, in May, June, and July. It occurs in England, Scotland, and Ireland. (The scientific name is *Fidonia atomaria*)



216. The Bordered White (*Fidonia piniaria*), male.

216. The Bordered White.—The antennæ of the male are strongly pectinated, indeed quite plumose; those of the female simple; male with a large triangular space at the

apex of the fore wings occupying almost half the wing, brown-black; the same colour occupies the inner and costal margins, but is mixed with yellowish markings, and therefore not of so dark a hue; the rest of the wing is white or yellow-white, an elongate brown blotch extending from the base of the wing to the middle of this yellow space, and there emitting two divaricating lines, which join the brown apical space; the fringe is alternately brown and pale yellow; the hind wings have the costal portion and the hind margin dark brown; the middle of the wing is pale yellow with two transverse



The Bordered White (male), underside.

brown lines and numerous small and irregularly sprinkled brown spots; the head, thorax, and body are marbled with brown and yellow-white. Female, orange-brown;



The Bordered White, female.

the costal margin of the fore wings brown, with two faint transverse bars of the same colour, both of them obscure; the first crosses the wing near the middle; the second commences at the costa and crosses before the middle of the wing; the fringe is alternately brown and gray-white; the hind wings are of the same colour as the fore, and have two very indistinct transverse brown bands; the fringe is white, slightly interrupted with white spots.

The EGGS are oblong, and laid in a row on the needles of the Scotch fir.

The CATERPILLAR is whitish green; the dorsal line rather broad, white; sub-dorsal line pale bluish-white; spiracular line yellow; spiracles orange; belly streaked longitudinally with light and dark green; head rather large in proportion to the body; the segments are conspicuously marked with pale whitish-green.

The MOTH appears on the wing in April and May, and is not uncommon in fir-plantations in England and Scotland; but Mr. Birchall did not find it in Ireland. (The scientific name is *Fidona piniaria*.)



217. The Rannoch Geometer (*Fidonia pinetaria*).

217. THE RANNOCH-LOOPER.—The antennæ are slightly pectinated in the male, simple in the female; the fore wings are of a burnt-sienna brown colour, having three umber-brown, transverse, slightly waved lines, and between the outermost of these and the hind margin is a fourth transverse line slightly indicated, and conspicuous only at the costal margin; the hind wings are rather paler and more yellow in their hue, and have two transverse lines less distinct than those on the fore wings; the fringe is of the same colour as the wings, as are also the head, thorax, and body. The underside of the moth is of a brighter and yellower colour than the upper side, and has the lines more distinct.

I have not seen the CATERPILLAR, which is described by Treitsche as feeding on the bilberry; and being of a reddish tint, with white stripes on the back, and a yellow stripe on the sides.

The MOTH appears on the wing in June and July, and has hitherto only been found on Scotch heaths, where it is abundant. (The scientific name is *Fidonia pinetaria*.)



218. The Frosted Yellow (*Fidonia conspicuata*).

218. The FROSTED YELLOW.—The antennæ of the male are strongly pectinated; those of

the female simple: the fore wings are orange-yellow, with the hind margin black-brown; the costal margin is also sprinkled with the same black-brown colour; the orange-yellow and brown being in nearly equal proportions; the middle of the wing and the inner margin are entirely of the orange-yellow colour and unspotted; the hind wings are of a dingy orange-brown, the margins thickly sprinkled with darker brown; the head and thorax are brown; the body variegated with yellow-gray and dark brown. The underside of the fore wings is dull orange, sprinkled transversely with short dark brown lines; the underside of the hind wings is variegated with orange and brown, and has six direct, longitudinal, silver stripes, the third and sixth of which extend from the hind margin to the base of the wing.

The CATERPILLAR if undisturbed rests in a straight posture, but if touched or annoyed assumes a curved position; its head is rather wider than the body, stretched forward, and divided on the crown; body uniformly cylindrical without warts or humps; head slightly shining, pale brown, with black markings, emitting about thirty short, slender, but rigid hairs; body greenish smoke-colour, striped longitudinally, and emitting short scattered hairs; a narrow stripe down the middle of the back smoke-coloured; on each side of this is a pair of very narrow, waved, approximate stripes also smoke-coloured on a greenish ground; then on each side of the body a broad blackish stripe; then a very distinct and conspicuous yellow stripe which encloses the spiracles; the belly has a pale stripe along the middle, and the space between this and the bright lateral stripe is greenish smoke-coloured, traversed by very slender pale waved stripes. These insects pass ten days in the egg state, and the caterpillars are full fed about the end of August, feeding on the common broom (*Cytisus scoparius*).

The MOTH occurs plentifully in Suffolk, in a few localities only, and flies in July; it is unknown in Ireland. (The scientific name is *Fidonia conspicuata.*)



219. The Drab Geometer (*Minoa euphorbiata*).

219. THE DRAB GEOMETER.—The antennæ of the male are very slightly pubescent; those of the female simple: all the wings are of a uniform delicate drab, perfectly without markings: the head, thorax, and body are of the same colour.

The CATERPILLAR has a bright red head, and either a bright green or smoky brown body, with a darker but interrupted medio-dorsal stripe, and a series of bright yellow spots on each side; it may be found throughout the autumn in our Kentish woods on the cypress spurge (*Euphorbia cyparissias*), on which it feeds: when full fed it descends to the ground, and forms a little cell on the surface, composed of earth and silk, in which it changes to a CHRYSALIS.

The MOTH appears in June, and is not uncommon in woods in the south of England, but has not been observed in Scotland or Ireland. (The scientific name is *Minoa euphorbiata.*)



220. The Black-Veined (*Scoria dealbata*).

220. THE BLACK-VEINED.—The antennæ are simple in both sexes: all the wings, as well as the head, thorax, and body, are white, with a tinge of gray; the antennæ, eyes, and costal margin of the fore wings black: all the wing-rays are also tinged with smoke colour, and there is an extremely slender black line round all the wings, just within the fringe. Beneath, the wing-rays, as well as margins of all the wings, are black, and the fore wings have a crescent-shaped black mark near the middle, and a narrow smoke-coloured band parallel with the hind margin.



The Black-veined, underside.

The EGGS are laid on various grasses at the end of June; they are of a deep bright orange-colour when deposited, but become almost black before they are hatched, which event usually takes place about the middle of July: the young CATERPILLARS feed freely on knot grass: they continue to grow slowly until they are somewhat more than an inch in length, when they retire for the winter, concealing themselves among the stems of grasses, &c., which appear to be their favourite resort. They now are long and slender, and rest on the knot-grass, attached by the claspers only, the body being held semi-erect; a slight bend occurs at the ventral claspers, and another at the third pair of feet, the intervening segments forming an elliptic arch; the head is porrected on a plane with the body, and the three pairs of feet are directed forwards, but not crowded together; when touched, shaken, or otherwise irritated, the anterior segments are bent downwards and contorted until they almost form a ring: head flat, porrect, exserted, of the same width as the anterior segments: body very slightly incrassated from the fourth to the tenth or eleventh segment, transversely wrinkled, and having a longitudinal lateral skinfold, which, by increasing the width of the caterpillar when stretched at full length, gives it a slightly depressed appearance; the anal flap is deltoid, its apex terminating in a few bristle-like hairs, which are directed backwards: head and body putty-coloured, striped longitudinally, the stripes varying only in intensity of colour: a dark and very narrow medio-dorsal stripe extends from the head to the tip of the anal flap; this is darker at the anal extremity, and is not perfectly uniform in width, but expands and contracts here and there in its course: this narrow stripe is intersected by a median, thread-like, paler stripe: on each side of the medio-dorsal stripe is a paler and broader stripe, containing a single series of black dots, and being also longitudinally intersected throughout by two thread-like rivulet markings of a slightly darker hue; each of these pale stripes unites with the pale lateral margin of the anal flap; adjoining each pale stripe is a darker stripe of similar width, and this is longitudinally intersected by three paler thread-like lines. Of these the middle one is the most distinct: adjoining this is a paler stripe, comprising the skinfold and spiracles; this commences behind the head, and terminates in the anal claspers: below the pale skinfold is a broader dark stripe, commencing behind the head, and terminating in the ventral claspers; this also is longitudinally, but very indistinctly, intersected with paler threads: ventral surface pale, longitudinally intersected by three dark stripes, each of which is double, or again intersected by a median pale threadlike stripe; these three ventral stripes commence at the third pair of feet, and terminate at the ventral claspers: legs and claspers with the same shade of colour as the body. After hybernation these caterpillars begin to feed about the middle of April, and are full fed by the middle of May, when each spins a delicate yellow shuttle-shaped cocoon, attached longitudinally to a culm of grass.

The MOTH appears on the wing in June, and is very common in one or two localities in Kent; it is unknown elsewhere in England or Scotland, but has been found by Mr. Birchall in Ireland. (The scientific name is *Scoria dealbata.*)



221. The Purple-barred Yellow (*Lythria purpuraria*), males.

221. THE PURPLE-BARRED YELLOW.—The antennæ of the male are strongly pectinated, almost plumose, the pectinations long and rather distant; those of the female are only pubescent: the fore wings are olive-yellow, with the fringe and two or three transverse bands, neither of which quite reaches the inner

margin, of a vinous rose-colour; the first of



The Purple-barred Yellow, female and male.

these bands is slightly bent, the second is oblique, but not bent: the hind wings are of a deep dingy fulvous colour, with rose-coloured fringe, and having the white of the base and the inner margin suffused with darker olive.

The back of the CATERPILLAR is either dull green or of the same vinous rose-colour as the perfect insect, with a darker medio-dorsal stripe: the belly is brighter green, the two colours being very distinctly separated: the head, feet, and claspers are of the same colour as the body. It feeds on the various species of polygonum and dock. I know of no moth more variable than this; it seems a perfect Proteus, capable of assuming any size or colour: it is very common on dry hills on the continent of Europe, and occurs also in Scotland and the north of England, flying by day, but has not been taken in any abundance in either locality, and has not been found in Ireland. (The scientific name is *Lythria purpuraria*.)



222. The Vestal (*Sterrha sacraria*).

222. THE VESTAL.—The antennæ of the male are slightly pectinated for above three-quarters of their length, then simple to the extremity; those of the female are simple throughout; the fore wings are pointed, and of a delicate canary-yellow with the costal margin at the base pink, and a very beautiful and very distinct oblique pink stripe, beginning at the point of the wing and ending at the middle of the inner margin, before reaching which it almost disappears.

The CATERPILLAR has been described by two excellent observers: first by M. Millière, in France; and secondly by Mr. Hellins, in England.

The EGGS are laid in August, on several kinds of dock and camomile, on the leaves of which the caterpillar feeds in a state of nature, but in confinement it has been successfully fed upon the common knot-grass. The egg is very long, oval, and ornamented with rows of hexagonal network; its colour at first is pale greenish-yellow, changing in a day or two to bright coral-red, and again, a few hours before the emergence of the caterpillar, to a smoky-gray. When full grown, the caterpillar is about an inch in length, slender, cylindrical, and tapering gradually towards the head, which is rather flat and wide; it rests with the back slightly raised, but if annoyed it curls up the anterior part of the body. The ground colour is green or blue-green, the posterior segments yellowish-green, the belly whitish-green, the head brownish-red with a pale stripe on each lobe, bordered above with brighter red, and below with darker brown; the body has a slender, pale, medio-dorsal stripe, bordered throughout more or less distinctly with bright rust or deep red colour, which at the incisions of all the segments after the fifth, expands into the form of a letter V, the apex pointing towards the head of the caterpillar; each of these marks encloses a three-cornered yellowish-white spot; the anal flap and ventral claspers are tinged with purplish-pink; the regions of the spiracles is yellowish-green, which becomes a stripe on the second, third, fourth, eleventh, twelfth, and thirteenth segments, and runs into the anal claspers. The CHRYSALIS is long and slender, the head-case projecting and narrower than the body; the wing-cases are widely separated and reach to the middle of the chrysalis; the antennæ-cases extend between the wing-cases; colour pale yellowish-olive; head and wing-cases pale olive-green, finely outlined with black. The chrysalis is enclosed in a fine open network cocoon of yellow silk, fastened between the stems of the food plant.

The MOTHS fly by day, and appear on the wing in July, August, and October; those of

October are certainly a second brood. It occurs very sparingly in the south of England, and Mr. Birchall records the occurrence of one specimen in Ireland in 1864. I ought to add, that from the singular varieties of this moth bred from the egg by the Rev. John Hellins, I am inclined to think it comprises many of the so-called species described by continental entomologists as distinct, such, for instance, as Sanguinaria of Esper, Labdaria of Cramer, Rosearia of Treitschke, &c., &c. (The scientific name is *Sterrha sacraria.*)



223. The Grass Wave (*Aspilates strigillaria*).

223. The Grass Wave.—The antennæ of the male are pectinated throughout their length; those of the female are simple; the margin of the hind wing is slightly scalloped. All the wings are gray, sprinkled with innumerable dots, each consisting of a single scale, of a dark brown colour; the fore wings have three pale, but distinct, very oblique brown bars; and the hind wings have three transverse bars of the same colour; the head, thorax, and body are gray.

The egg of this moth is laid in the autumn on the common ling (*Calluna vulgaris*), on which plant the caterpillar feeds. This is very small at the approach of winter, and then hybernates at the roots of heath and grass; in the spring it feeds again, and when full-fed, in April and May, it rests in nearly a straight posture, but falls from its food, and feigns death when touched or disturbed; the head is stretched forward, simple, and undivided on the crown, and is rather narrower than the body; the body is uniformly cylindrical, emitting here and there, throughout its length, short black bristles; it has two small dorsal warts on the eighth segment; two larger and nipple-shaped humps on the ninth segment, and two still smaller excrescences on the tenth segment, besides many other minute warts on different parts of the body; on the thirteenth segment, immediately above the anal claspers and below the anal aperture, are two points directed backwards. The colours are very obscure gray-brown of different shades, producing a somewhat mottled appearance, and the lighter colour assuming the form of narrow longitudinal stripes. It spins a slight web among the twigs of its food-plant, and therein changes to a chrysalis.

The moth, which is common on heaths in the south of England, appears on the wing about midsummer. It is very abundant in Ireland. (The scientific name is *Aspilates strigillaria.*)



224. The Yellow Belle (*Aspilates citraria*).

224. The Yellow Belle.—The antennæ of the male are pectinated throughout their length; those of the female are simple; the fore wings are yellow, obscurely spotted with purplish brown, and having two transverse lines of the same colour; the first of these is short and somewhat scalloped, the second is somewhat bent and more oblique; between these transverse lines is a spot of the same colour; hind wings paler, almost white, with a transverse waved gray line extending from the costal margin two-thirds of the way to the inner margin; there is a round spot of the same pale colour in the middle of the wing; the shaft of the antennæ is white, the fringe black: the eyes are black, the head and thorax yellow, the body white.

The insect is double-brooded; the eggs of the first brood are laid about the 20th of August, and probably during the ensuing fortnight, and those of the second brood are deposited in May on the wild carrot, bird's-foot trefoil, and several other plants: the young caterpillar of this second brood emerges about the 17th of June, and is full-fed at the end of July: it rests in a

slightly bent posture, with the anterior extremity raised, and on being touched or annoyed it suddenly tucks in its head, and the anterior extremity assumes the form of an Ionic volute; in this posture it remains until the apprehended danger has passed. Head rather narrower than the body, slightly notched on the crown, body of uniform substance throughout, without humps, but having the skin delicately shagreened; the thirteenth segment has below the anal flap two long, conical, acute points directed backwards. Head and body putty-coloured, with numerous narrow, waved, longitudinal stripes of a darker tint; of these the more conspicuous are five in number and approximate; the middle one, double during a part of its course, is darker towards the head, where the others are less conspicuous and paler; the spiracles are dark brown. On or about the 1st of August it changes in a very slight cocoon among the leaves of its food-plant; the CHRYSALIS is rather slender, and much attenuated at the anal extremity; it is beautifully variegated with two colours, wainscot-brown as the ground colour, and dark umber-brown, approaching to black, for the ornamentation; this is disposed in oblique stripes on the wing-cases, leg-cases, and antenna-cases; in rings on the abdominal segments, and in diversified markings on the thorax and body.

The MOTH appears on the wing in the middle of May and middle of August at Plymouth, on the south coast of England, and at Powerscourt, in Ireland, but has not been taken in Scotland. (The scientific name is *Aspilates citraria.*)



225. The Straw Belle (*Aspilates gilvaria*).

225. THE STRAW BELLE.—The antennæ of the male are strongly pectinated throughout their length; those of the female are simple; the fore wings are pale yellow, with many brown dots, and an oblique transverse pale brown line between the point of the wing and the middle of the inner margin, but not quite reaching either; between this line and the costal margin is a spot of the same colour; the hind wings are paler than the fore wings, and almost without markings; the shaft of the antennæ is pale yellow, the fringe brown, the eyes are black; the head and thorax are pale yellow, the body nearly white.

The CATERPILLAR is putty-coloured, with a tendency to a rosy tint in some specimens; it has no well-marked medio-dorsal stripe, but two lateral stripes on each side, both of them reddish brown; the thirteenth segment has, below the anal flap, two long conical acute points directed backwards; it feeds on the common yarrow (*Achillea millefolium*) throughout June.

The MOTH appears in August in the southern counties of England and at Powerscourt and in the county Galway in Ireland, but has not been noticed in Scotland. (The scientific name is *Aspilates gilvaria.*)



226. The Currant Moth (*Abraxas grossulariata*).

226. THE CURRANT MOTH.—The antennæ of the male are very slightly pubescent, those of the female perfectly simple; the fore wings are white, with a yellow blotch at the base, and a yellow, bent, transverse band beyond the middle. There are numerous black blotches, or markings on several parts of the wing. The situation, size, and number of these markings are so liable to variation, that it is impossible to frame a description that shall serve for every specimen; but I will describe their more general character. There are five black blotches on the costal margin, the first of which is enclosed in the yellow blotch at the base of

the wing; the second and third are oblong blotches; both the fourth and the fifth commence a transverse band of blotches, which border the yellow band already described, and on the hind margin itself are seven black spots, which extend into the white fringe, which is thus made alternately black and white; the hind wings are white, with two transverse bands of black spots, the first near the middle, the second on the hind margin: these are the principal markings, but there are always a few others; the head is black, the thorax is yellow, with a black spot in the middle, and another smaller one at the base of each wing; the body is yellow, with a row of black spots down the back, one row down each side, and two rows down the belly. This moth is so subject to vary, that it has been thought best to figure several remarkable varieties, which are in the rich cabinet of Mr. Gregson, of Liverpool, to whose great kindness I am indebted for the opportunity of enriching the work with these illustrations.



I have seen the females of this species busily engaged in oviposition, not only in the evening, but even in the middle of a warm summer's day, depositing a single egg on a leaf of gooseberry or black currant, and then flying off to another. I once counted ten females simultaneously occupied in this manner along a garden wall less than eighty yards in length.

Like the EGGS of most diurnal Lepidoptera they remain but a short time before hatching; the young CATERPILLAR feeds for two, three, or four weeks, rarely longer, and then spins together the edges of a gooseberry leaf, having first taken the precaution of making the leaf fast to its twig by numerous silken cables, which prevent the possibility of its falling when dehiscence takes place in the autumn; in the little cradle thus fabricated, the infant caterpillar sleeps as securely and as fearlessly as the



sailor in his hammock; snow-storms and wintry winds are matters of indifference to him; but no sooner have the gooseberry-bushes begun to assume their livery of green in the spring, than instinct informs him that food is prepared to satisfy his appetite; so he cuts an opening in his pensile cradle, emerges, and begins to eat. The full-fed caterpillar commonly rests in a straight posture, lying parallel with the branch; but when annoyed he elevates his back, and tucks in his head until it is brought into contact with the abdominal claspers; if the annoyance be continued, he drops from his food, hanging by a thread, rarely falling to the ground; but when this is the case, he is bent double, and remains a long time in that posture. Head rather small, prone, partially retractile into the second segment, scarcely notched on the crown; body of uniform thickness, without excrescences. Head emitting a few strong black hairs, intensely black, with the exception of the clypeus and base of the antennal papillæ, which are white; body cream-coloured, with a reddish-orange lateral stripe below the spiracles; this is conspicuous on the fifth,



sixth, seventh, eighth, and ninth segments, but less so at each extremity; the whole of the second segment, and the ventral surface

of the third, fourth, tenth, eleventh, twelfth, and thirteenth segments, is of the same orange-red colour as the lateral stripe; along the middle of the back is a series of large, but irregular, black spots; these are generally three in number, two amorphous, transversely placed, and small, the third trapezoid, much larger, and quite as broad as the other two; they assume an altered form on the tenth, eleventh, and twelfth segments; below these is a series of small streak-like black spots, and again below those, but above the lateral orange stripe, is an irregular series of rather large amorphous black spots.; below the orange stripe is an interrupted black stripe on each side, and on the belly are two distinct and continuous black stripes; legs black; claspers



blotched with black. Feeds in gardens on the gooseberry and black currant, and more rarely on the red currant, greatly preferring those trees of all three species when trained against a wall; in woods and hedges it may be found on black-thorn, which I believe to be its natural food; it is full-fed in May, when it spins a very slight and perfectly transparent cocoon, in which it fastens itself by the tail and changes to a chrysalis, the web or cocoon in no way hiding the CHRYSALIS, which at first is entirely yellow, but soon becomes black and glabrous, with seven yellow bands, three of which, the first, second, and third are dorsal only; the others are complete circles; the tail terminates in three or more very distinct hooks, which constitute its means of attachment to the interior of the cocoon.

The MOTH appears on the wing about midsummer, and is only too common in all our gardens, both in England and Ireland. (The scientific name is *Abraxas grossulariata.*)



227. The Clouded Magpie (*Abraxas ulmata*).

227. THE CLOUDED MAGPIE.—The antennæ of the male are almost simple, having a very slight and almost imperceptible pubescence; those of the female are perfectly simple; the fore wings are white, with a large yellow-brown blotch at the base; and another similar blotch on the inner margin near the anal angle; in each of these large blotches is a silvery cloud, composed of scattered silvery scales; beside these principal markings there are other dark-gray spots and blotches, the largest of which is on the costal margin, and at two-thirds of the distance between the base and the tip; hind wings white, with a large yellow-brown blotch on the inner margin, having a silvery cloud in it like the blotches in the fore wings; there are several dark-gray spots on the wing, some of which form a transverse band across the middle; head and thorax brown; body yellow, with a row of black spots down the back, two rows down each side, and two rows down the belly.

The CATERPILLAR is beautifully figured by Sepp, and its life-history given with great minuteness and accuracy; its head is black, its body gray, inclining to blue on the sides, and covered with black dots, which are arranged in series; it has a yellow stripe on each side, in the region of the spiracles; it feeds on elm during the autumn.

The MOTH appears in June and July, and is very common in the south-west and some of the midland counties of England, and has been taken in the county Wicklow, in Ireland, by Mr. Bristow. (The scientific name is *Abraxas ulmata*; it is also the *Abraxas pantaria* of all British authors, but not of continental ones, who give that name to a totally different species.)



228. The Scorched Carpet (*Ligdia adustata*).

228. The Scorched Carpet.—Antennæ of the male almost simple; those of the female quite so; the fore wings are white, with a large blotch at the base, and a broad transverse band beyond the middle, of a rich purple-brown; the band is very much bent; halfway between the blotch and the band are several short transverse marks of the same colour; and beyond the band, that is, nearer to the hind margin, are other similar markings; on the margin itself is a row of brown spots; the hind wings are white, with three waved scalloped brown bands, of a very pale brown colour, within which, that is, nearer the base, is a central brown spot; there are also a number of brown spots, more or less delicately marked, near the inner margin; the head and thorax are dark brown, the body dingy white.

The caterpillar is described by Guenée as being of a beautiful green colour, and having the head, the ventral claspers, and some lateral spots on the sixth and seventh segments of a deep red, mixed with yellow; the tenth and eleventh segments have also yellow patches spotted with red. It feeds on the skewer-wood (*Euonymus europæus*) in May and June.

The moth appears on the wing in June and July, and is rather common in England, and in the counties of Wicklow and Galway in Ireland. (The scientific name is *Ligdia adustata*.)



229. The Clouded Border (*Lomaspilis marginata*).

229. The Clouded Border.—The antennæ of the male are almost simple; those of the female quite so. All the wings are white, with smoky-black borders, the outer edge of which is bounded by the margin of the wing, but the inner edge is variously



indented with the white, which, in the fore wings, runs up in two places nearly to the costa; the hind wings have usually a median belt of black spots. The head, thorax, and abdomen are smoky-black. An extremely variable insect, scarcely two specimens being alike in the distribution of the black markings; four figures are given to show the extent and character of the variations. In the first of these there is a transverse black band crossing the middle of every wing;



in a second, this band is continuous only on the hind wings, and in the other two there is scarcely any black in the hind wings; indeed, it would be impossible, from an inspection of the hind wings only, to form any opinion as to the species to which these specimens belong.

The caterpillar is of a dark-green colour, with slender medio-dorsal and lateral stripes, which are sometimes yellow and sometimes white; there is a broader pale stripe along the spiracles; the head is green, with two



black spots on the face; the legs and claspers are green. It feeds on many species of willow, more particularly on the common sallow (*Salix capræa*).

The moth appears on the wing in May, June, July, and August, and is very abun-

dant in England and Ireland, but I have not seen Scotch specimens. (The scientific name is *Lomaspilis marginata.*)



230. The Horse-chestnut (*Pachycnemia hippocastanaria*).

230. The Horse-Chestnut. — The antennæ are almost simple in the male as well as the female; the fore wings long and narrow, like those of the genus Lithosia; the hind wings are rounded; the fore wings are brown, with a very slight tendency to purple, and have two narrow transverse pale bars, both of them indistinct; the first of these bars is near the base of the wing, and of a crescentic form; the second is almost parallel with the hind margin; between these two bars is a central dark spot; the hind wings are pale smoky-brown; the head and thorax are of the same colour as the fore wings; the abdomen of the same colour as the hind wings.

The caterpillar is sometimes found in great abundance by sweeping the heath in the heath-field at West Wickham. It has a very broad head, and a cylindrical body, of a dingy olive-green colour. I had a large number of these caterpillars brought to me in 1857, but unfortunately lost them during a temporary absence from home.

The moth appears in May, on the heaths of Surrey, Sussex, and Hampshire, but I have not heard of its occurrence in the midland or northern counties of England, in Scotland, or in Ireland; in France, a second brood makes its appearance at the end of June. (The scientific name is *Pachycnemia hippocastanaria.*)

Obs. The natural position of this species among the Geometræ seems extremely doubtful; its nearest allies appear to me to be the species of *Chesias* hereafter to be described; but Guenée thinks it has no characters in common with them except the elongated form of its fore wings. Herrich-Schaëffer points out its resemblance to the genera *Lithosia* and *Nola*, and even to *Sarrothripa Reayana*, a moth belonging to an entirely different section of the Lepidoptera. Both the English and scientific name are very inappropriate to an insect which in neither of its states has any connection with the horse-chestnut.



231. The Early Moth (*Hybernia rupicapraria*).

231. The Early Moth.—The antennæ of the male are slightly pectinated; those of the female simple; the fore wings of the male are ample, of a dark-brown colour, and having two transverse lines still darker; the outer and longer of these has a pale exterior margin; between these transverse lines is a conspicuous dark spot placed transversely between them; hind wings very pale, with a nearly median transverse line which is parallel to the semicircular margin; in the middle of the area enclosed by this line is a spot of similar tint. The wings of the female are very short, and cut off obliquely at the hind margin, as represented in the lower figure; these are palish brown, with a darker central band.

The eggs are laid in February, on the trunks and twigs of whitethorn, blackthorn, and less commonly of oak.

The caterpillars emerge in April, and, wandering among the twigs, are ready to begin eating as soon as the leaves expand: they grow rapidly, and have attained their full size by the end of May or beginning of June. The full-fed caterpillar generally rests with both feet and claspers attached to the food-plant, and the back arched. The head and body are of nearly equal width, the head not conspicuously notched on the crown; the body velvety and without humps or warts. In colour the variation is extreme;

the head usually semi-transparent apple-green; the more usual colour of the body glaucous-green, approaching to white on the dorsal, and to apple-green on the ventral surface; the white appearance of the back is partially due to the presence of whitish stripes, of which the more conspicuous pair extend on each side from the head to the anal extremity, and divide the dorsal area into three nearly equal parts; the other white markings are irregularly arranged in waved linear series, often imparting a reticulated appearance to the surface; at each interstice of the segments adjoining the principal white stripes are blotches of darker or olive-green. It is full-fed by the end of May, and then descends to the ground, and turns to a CHRYSALIS in a slight web on the surface.

The MOTH is very abundant in January and the first half of February; it seems to brave the coldest weather, and is common in England, Scotland, and Ireland. (The scientific name is *Hybernia rupicapraria.*)



232. The Spring Usher (*Hybernia leucophearia*).

232. THE SPRING USHER.—The antennæ of the male are slightly pectinated, those of the female simple; the wings of the male are long and rather narrow; they are very variable, some being dark brown with a central whitish bar, as represented in the lower figure, and having a row of roundish pale spots parallel with the hind margin; others are pale, with numerous dark transverse waved lines, as shown in the upper figure; the hind wings are pale, and sprinkled with dark dots. The female is almost without wings.

The EGGS are laid by the female on the trunks and branches of oak in March.

The CATERPILLARS emerge towards the end of April or beginning of May, and as soon as the leaves expand fasten them loosely together, forming a little domicile for concealment from the prying eyes of birds, which at this season are constantly on the look-out for caterpillars with which to feed their young. They are full-grown in June. Head narrower than the body, body obese, transversely wrinkled and verrucose, having also a manifest lateral skinfold. Colour infinitely varied. They change to CHRYSALIS on the surface of the earth.

The MOTH appears on the wing in February and March, and is common everywhere in England and Ireland. (The scientific name is *Hybernia leucophearia.*)



233. The Scarce Umber (*Hybernia aurantiaria*).

233. THE SCARCE UMBER.—The antennæ of the male are pectinated, the pectinations long, slender, and bent; those of the female are simple; the wings of the male are ample, the fore wings orange-ochreous, with three darker transverse lines, the first and second of which are near the base, oblique, direct, and short; the third is beyond the middle, oblique, and angled near the middle; there is a dark spot between the second and third line, and also an oblique transverse series of spots between the third line and the hind margin; the hind wings are paler, and have a slightly darker transverse line beyond the middle, and a central spot between this and the base. The female has mere stumps of wings, which are darker-

coloured than those of the male, and have two brown transverse bars on each; the body is orange-brown with two dark brown spots on each segment.

The CATERPILLAR has been described by Mr. Hornby: when first hatched it is of a deep yellow colour, which grows gradually darker until it becomes nearly black, excepting a medio-dorsal yellow stripe: when full-fed it is dusky greenish-black, with a light-brown medio-dorsal stripe; it feeds chiefly by night on the leaves of the white-thorn, and also occasionally on birch and oak, and spins a slight cocoon on the surface of the earth before changing to a CHRYSALIS, which is of a reddish-brown colour, with a dark medio-dorsal stripe. It is to be found in May and June.

The MOTH appears on the wing in October and November, and is not uncommon in most of our English counties. Mr. Birchall says it is common in Ireland. (The scientific name is *Hybernia aurantiaria.*)



234. The Dotted Border (*Hybernia progemmaria*).

234. THE DOTTED BORDER. — The antennæ of the male are slightly pectinated, of the female quite simple; the wings of the male are ample, those of the female very short and incapable of flight; the fore wings of the male are pale reddish-brown, with three transverse darker lines; the first and second of these are very short, and near the base of the wing; the third is much longer, more oblique, and bent towards the hind margin, at a third of the distance from the costa; beyond this the ground colour of the wing is darker, and between the second and third lines is a dark, transversely-linear spot; on the hind margin, but within the fringe, is a series of distinct dark dots; the hind wings are pale, with a dark central spot, and a waved line outside the spot; the short wings of the female are pale brown, with two darker bars across the fore, and one across the hind wings.

The CATERPILLAR is full-grown in May, when it rests in nearly a straight position, generally holding to its food-plant by both feet and claspers; the head is semi-porrect, and broader than the body; the body is of uniform substance throughout, without prominent warts or excrescences, but each segment bears a few scattered bristles, each bristle seated on an extremely minute wart; the colour of the head is generally brown, sometimes inclined to yellow; it has two indistinct paler bars across the face; the colour of the body is extremely various, but the prevailing shade always brown; the middle of the back generally paler, and forming a broad stripe; on each side is also a pale stripe, which includes the black and shining spiracles; this stripe is generally continuous, but sometimes divided, and then forms a series of pale spots. I have found these caterpillars in great abundance feeding on hornbeam in Epping Forest. They turn to CHRYSALIS just below the surface of the earth between the 24th of May and 1st June; the chrysalis is brown and shining.

The MOTH does not appear on the wing until the following February and March. It is common in Great Britain and Ireland. (The scientific name is *Hybernia progemmaria.*)



235. The Mottled Umber (*Hybernia defoliaria*) male, variety of male, and female.

235. THE MOTTLED UMBER. — The antennæ are pectinated in the male, simple in the female; the wings are ample in the male, of a pale wainscot-brown colour, with two dark brown bands; the first of these is short, crescent-shaped, and near the base:

the second is bent, angled, irregular, and beyond the middle; between them is a dark spot near the middle of the wing; the hind wings are rather paler, and have a brown spot near the middle; all the wings are more or less sprinkled with brown dots; this is the more common colouring of the insect, and is represented in the preceding column, but is very subject to vary, and is sometimes of a uniform reddish-brown, freckled all over with minute dots, as represented in this column; the wings of the female are so short and small as to be almost invisible. The body is of a wainscot-brown colour, with two very conspicuous dark spots on the back of each segment.



The CATERPILLAR, when full-fed, rests in a curved position; does not tuck in its head, or feign death, but when disturbed by the entomologist or otherwise, falls from its leaf or twig, and hangs by a thread eighteen inches or two feet in length, and, thus suspended, will swing for hours in the gentle breezes we sometimes have at the end of May after the east winds have taken their departure. This suspension seems to be sometimes a voluntary and recreational performance, for in passing through the woods I have sometimes seen thousands upon thousands of these beautiful caterpillars thus dangling in mid-air, and not unfrequently swinging themselves into my mouth and eyes. The head is rather large, and not notched on the crown; the body is uniformly cylindrical, and without humps; the head is without gloss, and brown; the body has a broad dorsal area, of a clear brown colour; this area is bounded on each side by a very distinct, but narrow, waved, black stripe, and is also adorned with gray markings, which are particularly conspicuous at the interstices of the segments where they approach the black boundary stripe; below the boundary stripe the body is bright yellow; the spiracles are white, and the region surrounding each spiracle brown; the belly is greenish-yellow; legs and claspers pale. A beautiful but very abundant caterpillar. It feeds on hornbeam, whitethorn, blackthorn, hazel, oak, and many other trees, and is full-fed at the middle of June, when it changes to a CHRYSALIS on the surface of the earth.

The MOTH appears in October, and is very common in England and Ireland. (The scientific name is *Hybernia defoliaria.*)



236. The March Moth (*Anisopteryx æscularia*).

236. THE MARCH MOTH.—The antennæ of the male are pectinated, but not strongly so; those of the female simple: the wings of the male are ample, those of the female wanting; the fore wings of the male are rather long and rather pointed, of a dingy brown colour, with a pale zigzag transverse line beyond the middle; on the inner margin of this line the ground colour of the wing is darker, and near the base of the wing is a shorter transverse line, the outer margin of which is bordered with a darker ground colour; there is a shorter, transverse, dark spot between these two lines; the hind wings are paler, with a dark central spot, and a faint zigzag line just beyond this spot. The wingless female is brown, and has a conspicuous tuft at the extremity of the abdomen.

The CATERPILLAR feeds on the elm, oak, lime, whitethorn, and blackthorn; its head and body are of a pale clouded green colour, with a whitish stripe on each side, and a brighter and more distinct pale line in the region of the spiracles.

The MOTH appears on the wing in April, and is abundant in Great Britain and Ireland. (The scientific name is *Anisopteryx æscularia.*)



237. The Winter Moth (*Chimatobia brumata*).

237. The Winter Moth.—The antennæ in both sexes are nearly simple; the fore wings of the male are rounded, and of a grayish-brown colour, tinged with ochreous, and having several narrow transverse waved bars, which in some specimens are associated in three pairs; the hind wings are pale, with scarcely any markings; the wings of the female are very short, are quite unadapted for flight; her locomotive power is restricted to running about on fences and trunks of trees, much in the manner of a spider.

This is one of our most injurious insects, and therefore requires a somewhat more elaborate and lengthened history than we can afford to give to others of less economical importance. The apterous female lays eggs in the crevices of the bark of various trees and shrubs during November and December; when laid the eggs are greenish-white, but they become orange, and subsequently brown, before hatching, which takes place about the beginning of April.

The caterpillars are extremely small at first, and suspend themselves by threads, and are blown about in all directions by the cold winds of spring; many must certainly perish, but multitudes escape, and find congenial homes; they commence their destructive career by eating into the young unexpanded buds: at this time of the year the bullfinches, sparrows, and titmice render the most important services to the gardener, by their activity in devouring the buds, and thus destroying this little garden-pest. When the leaves have begun to expand, each caterpillar draws two or three together, and unites them by a silken web, coming partially out to feed, and retiring again within its domicile when satisfied. When full-fed it rests with its head on one side, and curled round so as to touch the middle of its body. The head is scarcely so wide as the body, and scarcely notched on the crown; the body is rather obese, decreasing in size towards each extremity. Head pale green, semi-transparent, the cheeks often blotched with smoky-brown on each side, just in the region of the ocelli. The body is glaucous-green, with a narrow median blackish stripe on the back, and three narrow white stripes, at equal intervals, on each side; the third or lowest on each side includes the spiracles. The legs and claspers are transparent green. It is a variable larva, the colour sometimes green, sometimes smoky-brown, approaching to blackish; the stripes in different individuals differ greatly in distinctness; the mediodorsal stripe is apparently in great measure due to the food in the alimentary canal being visible through a very transparent skin; it is sometimes bordered on each side by an obscure white stripe, thus making eight stripes in all. It is almost useless to specify any tree as the food-plant of this ubiquitous larva; I have beaten it by thousands from the hornbeam in Epping Forest, and I am unable to mention a tree the leaves of which it does not devour; it is especially destructive to plantations of filberts, to plums and bullace, quinces, medlars, and in a less degree to apples and pears.

The moth appears everywhere in October, November, and December; it is full-fed in May, and then descends to the earth, and changes to a chrysalis near the surface. (The scientific name is *Chimatobia brumata*.)

Obs. It may be assumed that so injurious an insect has excited considerable interest, and that many remedies have been prepared, and experiments tried, to arrest its ravages. I have extracted a detailed account of these, published a few weeks back in the *Field* newspaper, and having more especial reference to the cider and perry orchards of Herefordshire and Worcestershire.

When the destruction of these insects on a large scale is to be effected, the operation should be divided into three campaigns,

corresponding to the three stages of the enemy's existence—caterpillar, chrysalis, and moth.

1. When the caterpillar is still in the buds it must be left to the bullfinches and titmice, as human exertions fail to effect any considerable diminution of its numbers. It is not, however, to be supposed that bullfinches only pick off those buds which are infested with these caterpillars: the contrary is most assuredly the case, and a little company of these pretty birds—they travel in little companies of four, five, or six—will not unfrequently settle in a gooseberry-bush, or plum-tree, and not leave it until half the buds have been picked off. It is a remarkable fact, and one that I have repeatedly verified, that scarcely half of the buds thus destroyed are eaten; the remainder may be observed scattered on the ground beneath. When the caterpillars have emerged from the bud, fed for some fortnight or three weeks, and are nearly full-grown, shaking or striking the trees with a stick will cause them to fall to the ground, or to hang by a thread. When on the ground they can be crushed under foot, or caught in cloths and burned. Before shaking the tree some persons daub the stem near the ground with a sticky mixture, or pour coal-tar on the ground round the stem, to cut off their escape as they retreat: a good plan where the trees stand alone, but of little service where there is an undergrowth of gooseberry or currant bushes, as the caterpillars will ascend them.

2. Little can be done against the insect in its chrysalis state. Digging the ground under the trees in August has theoretical advantages: it displaces the chrysalis from its self-selected habitation, and subjects it to the chance of more or less moisture than is congenial to its nature: and breaking up the soil exposes it to the attacks of beetles, earwigs, and birds, all of which feed upon it. Several years' experience has failed to show much practical benefit from the process. It can only be recommended as auxiliary to other means of destruction.

3. The third campaign is the most important. The female moth, having no wings, is compelled to climb the tree to deposit her eggs, and may be caught by a sticky composition placed in her path.

In Germany this is done by surrounding the stem with a four-sided box about twelve inches high, the lower end of which is fixed in the ground, and the upper end coped. Tar daubed every few days on the outside of the box, below the coping, catches the females in their ascent. This box plan was found to be expensive for thickly-planted orchards, so it became important to get a composition which might be applied directly to the stem without injury to the tree. Various things were tried, of which Stockholm tar and cart-grease mixed in equal proportions proved to be the best. This compound remains sticky four or five days, and the experience of eight years shows that it does no material injury to the trees if applied in November and December, the period when the moth is out; but applied in the warm weather of April and May it has proved destructive in many cases, probably from its greater fluidity in the latter case, allowing the tree to absorb it prior to drying.

The composition rather tightens the bark, which should therefore be slit the next summer, but in other respects does no injury that can be perceived, even when trees are cut down and split open; and the growing bark sliced off with a knife is the same colour where the daub is applied as in other parts. It may be employed without fear, but where fear does exist, a coat of whitewash made of whitening and glue size applied before the daub will afford additional safety, as thick grease will not penetrate glue.

From the 20th October to the 20th of December, the gardener should examine his plantation every evening with candle and lantern, and destroy by hand all the moths within reach. The couples are mostly on the stem or within reach, and very visible. If he find the moths numerous—and sometimes they are (the men say) as thick as bees—he should the following day daub his trees with a ring of this composition round the stem or branches in the most convenient places, taking care to leave no other path to the tree, such as side shoots, or

contact with the branches of other trees, for the ascent of the female. By this means hundreds, nay thousands, of females have been destroyed on a single plantation in one night, and as each female is calculated to lay 200 eggs, the destruction of caterpillars for the following season is very great. The daub must be renewed every few days, and the trees should be well shaken when the daub is applied, to dislodge as far as possible any female moths that are in them. The composition loses its stickiness in frosty weather, but the moths do not then come from their hiding-places under the dead leaves and in the cracks of the ground and bark.

Where winter moths exist, the pruning of fruit-trees should not be done till after Christmas, that a portion of the eggs may be carried away with the prunings, none of which should be dug in or allowed to remain on the ground, as the egg would hatch in the spring, and the young caterpillar ascend the nearest tree or shrub.



238. The Northern Winter Moth (*Chimatobia boreata*).

238. THE NORTHERN WINTER MOTH.—The antennæ are nearly simple in both sexes; the wings of the male fully developed; the fore wings are semi-transparent grayish-brown, with an ochreous tint, and having several, generally seven, narrow transverse lines, three of which, near the base, are oblique and approximate; the others form two waved pairs; hind wings very pale brown, without markings, and almost transparent; female with very small undeveloped wings; quite incapable of flight; the fore wings pale brown with a darker bar in the middle.

The CATERPILLAR is very similar to that of the winter moth, but more transparent, and the stripes more indistinct, but it chiefly differs from that very common species in having a brown head, that of the winter moth being pale green and semi-transparent: it feeds on birch.

The MOTH appears in October, and is not uncommon in the English counties, but has not been recorded for Scotland or Ireland. (The scientific name is *Chimatobia boreata*.)



239. The November Moth (*Oporabia dilutata*).

239. THE NOVEMBER MOTH.—Antennæ almost simple, and the wings ample in both sexes; fore wings pale smoky-gray, with several transverse waved lines of a darker hue, somewhat smoke-coloured; but both the ground colour and the lines or bars are too subject to variation in tint to admit of any precise description; hind wings, paler and with several slender zigzag lines parallel with the hind margin.



The second figure represents a pale variety of this very common moth. It ought to be added that entomologists have given names to several of the varieties of this moth; ventilata of Fabricius, impluviata, affinitata, and carpinata of Borkhausen, inscriptata of Donovan, fimbriata of Haworth, and neglectata of Stephens, are all referred by Guenée to this species.

The head of the CATERPILLAR is rather narrower than the body, and not notched on the crown; the body is stout, velvety, and cylindrical; the colour of the head is dull green, the mouth tinged with purple; the body is apple-green above, but liable to great variation, purple markings sometimes

appearing on all the segments; the back of the second segment, and a median line on the tenth, eleventh, and twelfth segments are often of this colour, and the thirteenth segment is generally tinged with purple; there is, moreover, a white stripe just below the spiracles; the body is glaucous or blue-green; the legs are pale transparent green, the claspers of nearly the same colour, but often tinged or blotched with purple. It feeds on whitethorn, blackthorn, hornbeam, sloe, oak, and almost every forest tree, and is full-fed in June.

The MOTH appears on the wing in November, and is common everywhere in England, Scotland, and Ireland. (The scientific name is *Oporabia dilutata.*)



240. The Autumnal Moth (*Oporabia filigrammaria*).

240. THE AUTUMNAL MOTH. — The antennæ are almost simple in both sexes; the fore wings are gray, with numerous darker transverse waved lines, and are subject to the same variations as those of the preceding species, from which, however, it appears constantly to differ, in being of less size, and in having the fore wing narrower and considerably more pointed.

The CATERPILLAR is described by Mr. Hellins as feeding on sallow; it is stout and smooth, the general colour rich velvety green, the belly pale whitish-green; the head and second segment shining, and having a blackish tinge; on each side of



the dorsal vessel is a pale yellowish-green stripe, and on each side are two sulphur-yellow stripes; on the back of each segment tubercles appear as minute yellow dots; the segmental divisions are orange-yellow; the spiracles are yellow, and between them and the belly are a few speckles. The caterpillars bury themselves in the earth in April, to undergo their transformation.

The MOTHS are taken in August and September, and have only been found in the north of England and in Scotland, never in the south of England or in Ireland. (The scientific name is *Oporabia filigrammaria.*)



241. The Twin-spot Carpet (*Larentia didymata*).

241. THE TWIN-SPOT CARPET.—The antennæ of the male are slightly pectinated; those of the female simple; the fore wings of the male brown, with four irregular transverse waved pale gray bars; the first of these is short, narrow, and very near the base; the second broader and double; the third, also broader and double, is beyond the middle of the wing; the fourth is narrow, interrupted and parallel with the hind margin; between the third and fourth of these bars, about its middle, is a double dark spot, which gives the insect its name; the hind wings are paler, with several trans-



verse waved markings. The female is altogether paler, that is, of a pale whitish gray, the markings of the male being perceptible, but not conspicuous.

The CATERPILLAR feeds on the common chervil (*Anthriscus sylvestris*), and may be obtained by shaking the leaves of that plant into an open umbrella in April and May; it is of a pale green colour, with a narrow green stripe on each side.

The MOTH appears on the wing in June, and is common in England, Scotland, and Ireland. (The scientific name is *Larentia didymata.*)



242 The Mottled Gray (*Larentia multistrigata*).

242. The Mottled Gray.—The antennæ are slightly pubescent in the male, quite simple in the female; male much larger than the female: the wings in both sexes ample; fore wings gray, transversely barred with darker gray; sometimes the ground colour has an ochreous tinge; the transverse markings are irregular, waved, and interrupted, and rather like series of dots than consecutive lines; the hind wings are pale gray, transversely marked with dark but indistinct waved lines towards the hind margin.

The egg is laid in April, on the different species of lady's bedstraw, but feeds freely on sweet woodroof in confinement; it rests in a nearly straight or slightly arched position, the feet as well as the claspers generally attached, and the head prone and tucked under. The head is as wide as the second segment, and not notched on the crown; the body is uniformly cylindrical, the segmental divisions well marked, and the lateral skinfold rather prominent. The colour of the head and body is gray-brown, occasionally tinted with pink or yellow; a narrow medio-dorsal clearly-defined darker stripe runs from the second segment to the tip of the anal flap; three broader, less regular, and less clearly-defined stripes run along the sides parallel with the medio-dorsal stripe, and between this and the spiracles; ventral surface paler than the dorsal surface, and having an extremely slender and delicate medio-ventral stripe; and between this and the spiracles are three other stripes, all of which are waved, and that nearest the medio-ventral is double; the spiracles are intensely black; in addition to the stripes are numerous extremely small warts, darker than the general surface, and each emitting a minute bristle.

The moth appears on the wing in early spring, and is found in most parts of England and Scotland, and in the county Dublin, in Ireland. (The scientific name is *Larentia multistrigata*.)



243. The Gray Mountain Carpet (*Larentia cæsiata*).

243. The Gray Mountain Carpet.—The antennæ are almost simple; the fore wings gray with numerous darker, transverse, zigzag markings; across the middle of the wings these darker markings form a transverse median bar, the costal extremity of which is divided, and encloses a gray space, which contains an oblong central dark spot; the hind wings are very pale, with an oblong dark spot above the middle, and three transverse waved lines towards the hind margin.

The egg is laid on the slender stalks of the wort, whortleberry, or bilberry (*Vaccinium Vitis-Idæa*), in July and August, and the young caterpillar emerges in about twelve days, but soon hybernates on the surface of the earth, at the roots of the food-plant; it begins to feed again in April of the ensuing year, and is full-fed by the second week in May; it then rests on the stalk of its food-plant by day, generally with the head downwards, and in a perfectly straight position; on the approach of evening it turns round, re-ascends the stalk, and feeds on the leaves during the night. When full-grown the head is prone, scarcely so wide as the second segment, and without any manifest notch on the crown; the body is of uniform substance throughout, and having a perceptible lateral skinfold along the region of the spiracles; each segment has a few small warts, and each wart emits a short and feeble bristle. The colour of the head is umber-brown, in some specimens inclining to red; the body is velvety red-brown, or velvety olive-green; in both varieties there is a series of medio-dorsal V-shaped markings of great beauty, these occur on the fifth, sixth, seventh,

eighth, ninth, tenth, and eleventh segments; the apex of each mark points towards the head; the sides of these marks are not quite closed at this point, but allow the passage of a fawn-coloured stripe which expands immediately after entering the area enclosed by the V, and is again restricted to a mere line where it approaches the boundary of the segment; the remainder of the area enclosed by the V is of a lovely rose-colour; each side of the V is bordered with rich brown; anterior to each V, that is, adjoining the anterior margin of each segment, are four short parallel lines, pale in the brown variety, perfectly white in the green one; the lateral skinfold in both varieties is almost white, and thrown up in bold relief by contrast with the ground colour immediately adjoining it; the belly is of the prevalent ground colour; the legs are semi-transparent and pinkish; the claspers of the prevailing ground colour. It spins a slight cocoon amongst the leaves of its food-plant, and changes to a CHRYSALIS in May.

The MOTH appears on the wing about midsummer, and is very abundant in the northern counties of England, as Durham, Lancashire, Cumberland, &c., and also in Scotland; it is generally distributed in Ireland. (The scientific name is *Larentia cœsiata.*)



244. The Yellow-ringed Carpet (*Larentia ruficinctata*).

244. THE YELLOW-RINGED CARPET.—The antennæ are almost simple in both sexes; the fore wings are grayish lead-colour, with five transverse yellowish bars, equidistant from each other, and also numerous dotted lines; the hind wings are paler lead-colour with obscure darker bars towards the hind margin.

The CATERPILLAR, according to Freyer, feeds on the white meadow saxifrage, in May; it is of a tawny or olive-green ground colour, with a medio-dorsal series of triangular red spots, each of the spots edged with white.

The MOTH appears on the wing in July, and is confined to a few localities, in Lancashire, Westmoreland, Cumberland, and Perthshire; it has not yet been discovered in Ireland. (The scientific name is *Larentia ruficinctata.*)

Obs. In reference to the extreme difficulty experienced by southern entomologists in obtaining this and other northern species, I strongly recommend the collectors of our British lepidoptera to make their wants, as well as their superabundance, known through the pages of "The Entomologist:" by this means alone can anything approaching a perfect collection be formed. I have established that little Journal with this especial object, and also for the convenience of answering any questions as to names, &c. It only costs sixpence a month, and is a means of communication between all our principal entomologists; the miscellaneous information it contains would be out of place in a systematic work like the present.



245. The Striped Twin-spot Carpet (*Larentia salicata*).

245. THE STRIPED TWIN-SPOT CARPET.—The antennæ are pubescent in the male, simple in the female; the fore wings are grayish lead-colour, with numerous zigzag transverse markings, some of which unite in forming a transverse median bar, which is divided by a paler space, enclosing a dark dot near its costal extremity; the hind wings are pale lead-colour, with darker waved markings near the hind margin.

The CATERPILLAR, in a state of nature, feeds on several species of bedstraw, and in confinement it not only feeds on bedstraw, but thrives equally well on sweet woodroof, a plant much to be recommended as growing

luxuriantly in London and country gardens, and as furnishing an acceptable food to nearly all those caterpillars which, in a state of nature, feed on the different species of bedstraw. The caterpillars of *Larentia salicata*, when full-fed, rest with the claspers attached tightly to the food-plant, and from the abdominal pair the body ascends at a right angle, the anterior segments being bent gracefully over; when annoyed the peculiarities of this posture become intensified, the anterior segments assuming the form of an Ionic volute, of which the tightly tucked-in head is the centre; this figure becomes more and more rigid as the annoyance continues, until the caterpillar abandons its hold on the food-plant, rolls itself in a compact ring, and, feigning death, falls to the ground. The head is rather small, semi-porrect, not notched on the crown, and beset with a few hairs; the body is of uniform thickness throughout, without humps or warts, but beset with scattered hairs, and having a rather remarkably conspicuous tuberculated double skinfold along each side below the spiracles. The head is pale, semi-transparent, and of an umber-brown colour, spotted with darker umber-brown; the body is umber-brown, with four narrow approximate parallel whitish stripes, extending the entire length of the back; on each side below the spiracles, and comprising the skinfold already noticed, is a broad pale somewhat flesh-coloured stripe; the ventral surface is rather pale along the middle, but darker on the sides, where it touches the pale lateral stripe; it also exhibits traces of four parallel narrow stripes, of which the inner pair are very obscure; the feet and claspers are similar in colour to the darker parts of the body. When full-grown, these caterpillars in my cages spun together the leaves of the woodroof, incorporating particles of cocoa-nut husk, provided for their accommodation, and constructing tough cocoons.

The MOTH appears on the wing early in June and again in August, it is common in a few localities in the west and north of England, also in Scotland, and at Killarney and in the county Galway in Ireland. (The scientific name is *Larentia salicata*.)



246. The Beech-green Carpet (*Larentia olivata*).

246. THE BEECH-GREEN CARPET. — Antennæ very slightly pubescent in the male, quite simple in the female; fore wings olive-green, and having a nearly triangular blotch at the base, and a central serrated bar much darker; and beyond and immediately adjoining this bar is a double zigzag white line, and again beyond the double white line is a transverse series of three dark spots near the angle of the wing; the hind wings are brownish lead-colour, without any conspicuous markings.

The EGGS are laid at the end of August, on a species of bedstraw (*Gatium mollugo*), and the CATERPILLARS are red when first hatched, but soon become rugose and dingy-coloured; they hybernate very early at the roots of the bedstraw.

The MOTH appears on the wing about midsummer, and is generally distributed, but is not common; it is occasionally taken in most of the English counties and also in Scotland and Ireland. (The scientific name is *Larentia olivata*.)



247. The Green Carpet (*Larentia pectinitaria*).

247. THE GREEN CARPET.—The antennæ are very decidedly pectinated in the male, but simple in the female; the fore wings are rather pointed, and have a decided and very beautiful green tint; at the base they have a somewhat triangular blotch, which has black margins and a pale centre, and is bordered by a white line; across the middle of the wing is a transverse band, wide at the costal, and narrower

at the inner margin; both sides of this band are very irregular and toothed, and are bordered by a delicate white line; and just within these white lines, both at the costal and inner margin, is a black blotch, those on the costal margin being large, distant, and conspicuous, those on the inner margin near together, and almost united; there is also an oblique black spot at the apex of the wing; the hind wings are pale, with indistinct waved lines; the eyes and feelers are very black, the thorax pale green, with a black transverse line before the middle; the body is pale green, with a medio-dorsal series of black dots, and with white margins to the segments.

A writer in the "Entomologist's Weekly Intelligencer," who does not give his name, but whose accuracy is unquestionable, says the CATERPILLAR'S not being so well known as the abundance of the perfect insect would lead one to expect, need not be wondered at; it is such a sluggish creature, and so fond of hiding at the roots of its food-plant, that he would think scarcely any one who had not taken the trouble to breed it can have seen it; some which he had in confinement remained motionless, as if dead, for hours; in fact, he never once saw them move, although he watched them often. When first hatched they are bright red, but soon become dingy; when full-grown they are short, stout, and wrinkled, with small black tubercles emitting bristles; the ground-colour is a dingy olive-brown, with a dark interrupted dorsal line, from the fifth to the tenth segment; a row of reddish V-like marks, having the apex of each pointing towards the head, and the side-lines reaching almost to the spiracles; from the tenth segment to the tail is a broad stone-coloured strip; the sub-dorsal line is light and waved; the belly fawn-colour, with dark patches above the feet It feeds on two species of bedstraw (*Galium mollugo* and *G. saxatile*).

The MOTH appears on the wing through out June and during part of July, and is generally common in England, Scotland, and Ireland. (The scientific name is *Larentia pectinitaria*.)



248. The Rivulet (*Emmelesia affinitata*).

248. THE RIVULET.—The antennæ are simple in both sexes; the fore wings are dark dusky gray, with a number of transverse irregular waved lines, both darker and lighter; just beyond the middle of the wing is a very distinct double rivulet line, pure white; and half way between this double line and the hind margin, is an interrupted series of white spots, which in some specimens almost form a second line; the hind wings are paler, with a still paler bar across the middle.

The CATERPILLAR lives enclosed in the seed-capsules of various plants; according to Guenée, it is of a dirty-white colour, with black head, legs, and spiracles; it has also a black dorsal plate on the second segment.

The MOTH appears on the wing in June, and is not uncommon in several of the English counties, but has not been observed in Scotland or Ireland. (The scientific name is *Emmelesia affinitata*.)



249. The Small Rivulet (*Emmelesia alchemillata*).

249. THE SMALL RIVULET.—The antennæ are simple in both sexes; the fore wings are dusky gray, with numerous transverse waved lines both darker and lighter; just beyond the middle of the wing is a very distinct double rivulet line, pure white, and half way between this and the hind margin, is a very conspicuous transverse white spot on the costal margin; the hind wings are paler, but still of the same dusky gray as the fore wings; there is generally also a paler bar across the middle, but this is not very constant.

Mr. Crewe has described the CATERPILLAR as short, stout, and stumpy; the ground-colour is dull red, suffused with yellowish green, or *vice versâ*; the central dorsal line is broad, and

of a yellowish green colour, with a slender dark green line in the centre. The sub-dorsal lines are red, edged with yellow. The head is flattened and of a dark reddish brown colour; the spiracular line greenish yellow; the belly is greenish yellow, with two darker green sub-ventral lines; the back and sides are studded with a few very short whitish hairs. Mr. Crewe found this caterpillar feeding somewhat abundantly in August and September, 1862, on the leaves, flowers, and unripe seeds of *Galeopsis tetrahit*, and more sparingly on those of *G. ladanum*. The CHRYSALIS is enclosed in a tightly-spun earthen cocoon; it is of a yellowish-green colour, slightly tinged with red.

The MOTH appears on the wing in June, and occurs wherever its food-plants are found in England, Scotland, or Ireland. (The scientific name is *Emmelesia alchemillata.*)



250. The Grass Rivulet (*Emmelesia albulata*).

250. THE GRASS RIVULET.—The antennæ are simple in both sexes; all the wings are pale gray, inclining to white, with numerous transverse waved lines quite white; the most conspicuous of these are two, close together, just beyond the middle of the fore wings, and a third half-way between these and the hind margin; the hind wings are almost without markings.

The CATERPILLAR of this moth has been found by the Rev. Hugh A. Stowell. The head is rounded, and narrower than the body; the body is rather stout, and transversely wrinkled, having a corneous shining plate on the back of the second and thirteenth segments. The head is intensely black and shining; the body is dingy white, tinged with green, and having broad medio-dorsal stripe, and a narrower lateral stripe darker green; each segment has six, eight, or ten minute black dots; and plates on the second and thirteenth segments are smoke-coloured, and there is a similarly-coloured corneous plate on the outer side of each of the anal claspers; the legs and claspers are nearly concolourous with the body, but rather more dusky. It spins together the sepals of the yellow rattle (*Rhinanthus Crista-galli*), feeding on the seeds, and is full-fed about the middle of August, when it changes to a CHRYSALIS within the domicile it has already formed.

The MOTH appears on the wing during the following June, and is very generally distributed in England, Scotland, and Ireland. (The scientific name is *Emmelesia albulata.*)



251. The Sandy Carpet (*Emmelesia decolorata*).

251. THE SANDY CARPET.—The antennæ are simple in both sexes; the fore wings are pale wainscot-brown, rather inclining to dull ochreous-yellow, and having numerous irregular waved transverse white lines; the most conspicuous of these are a pair almost close together across the middle of the wing, but these are interrupted in the middle by two tooth-like projections of the ochreous ground-colour; near the base of the wing are three of these waved white lines, all less conspicuous than the median pair; and half-way between the median pair and the hind margin is a single irregular and indistinct waved white line. The hind wings are dingy white, with few and inconspicuous markings.

The MOTH appears on the wing in June, and is of general occurrence in England, Scotland, and Ireland, but I have not found it very common. (The scientific name is *Emmelesia decolorata.*)



252. The Barred Carpet (*Emmelesia tæniata*).

252. THE BARRED CARPET.—The antennæ are simple in both sexes. The fore wings have

a triangular blotch at the base, and a broad median transverse bar, very dark brown (in recent specimens in fine condition almost black); the space between these two conspicuous marks, and also the space between the bar and hind margin, are pale reddish brown; the margins of both the dark markings are delicately bordered with white, and the outer white border of the median bar expands on the costa into a conspicuous white spot; the hind wings are pale dingy brown, with a paler waved transverse line below the middle, and a black spot above the middle.

The MOTH appears on the wing at the end of June and in July, and occurs in some abundance in the lake districts of England and Ireland, being particularly attached to the holly. Mr. Birchall and the late Mr. Bouchard obtained it abundantly by beating holly trees in the neighbourhood of Killarney; but Mr. Birchall thinks it resorts to the hollies for concealment only, and not as a food-plant. It is an extremely beautiful and distinct species. (The scientific name is *Emmelesia tæniata.*)



253. Haworth's Carpet (*Emmelesia unifasciata*).

253. HAWORTH'S CARPET.—The antennæ are simple in both sexes; the fore wings are dull brown, with numerous transverse waved lines, and a distinct double rivulet line just beyond the middle; the inner section of this double rivulet line is white, the outer ferruginous; half way between this and the base, is a second double rivulet line, much more obscure; between these two double lines the area of the wing is darker than beyond them, and there is a very evident, although not conspicuous, discoidal spot; half way between the exterior rivulet line and the hind margin is a transverse series of pale spots, interrupted in the middle; and near the apex of the wing are two short oblique black lines, or markings, almost fused into one, and also a double, or twin spot, as in *Larentia didymata;* the hind wings are pale, dingy brown, with a few waved darker lines, and a central darker spot.

The MOTH appears on the wing in July, but is very rare; the most copious capture I have heard of is that of Mr. Hodgkinson, in 1865, in the lake district of the north of England; Mr. Doubleday has taken it at Epping, and Mr. M'Lachlan at Forest Hill.

1*st Obs.*—I have adopted the name from Doubleday's synonymic list and Guenée's *Species Général*, but, without wishing to imply that I agree with it: the insect before me corresponds with the description of *Phalæna bifaciata* of Haworth (p. 334), and figured by instruction of the late Mr. Stephens, by Wood, under that name (fig. 702); the figure of unifasciata in Wood (701), also from the same source, bears no resemblance whatever to the insect I have described. Herrich-Schaëffer's description of Aquilaria (Geometræ, p. 163, No. 151, and figured pl. 55, fig. 336), is without doubt the insect under consideration. Seeing that our three English authors, Haworth, Stephens, and Wood, have made two species out of one, and that all later authors agree in combining them, and in dropping the first name, bifaciata, I should have preferred adopting Herrich-Schaëffer's name, as combining the two others, and as admitting of no doubt.

2*nd Obs.*—This pretty moth closely resembles *Coremia ferrugata*, to be described further on; it appears quite out of place here.



254. The Heath Rivulet (*Emmelesia ericetata*).

254.—THE HEATH RIVULET.—The antennæ are simple in both sexes; the fore wings are smoke colour, and are traversed by numerous white bars; the first of these is short, and very near the base, and generally single, but sometimes double; the second is nearer the middle of the wing, nearly straight, and always double; the third is situated beyond the middle of the wing, is bent and angled, and always double. In some specimens the

second and third bars approach, and are united near the middle; half way between the third bar and the hind margin is a single delicate white line, regularly serrated; the hind wings are pale smoke-coloured, with transverse lighter lines faintly indicated.

The MOTH appears on the wing in June and July; it is purely a heath insect, occurring in the lake district of the north of England, near Edinburgh and Glasgow in Scotland, and on the Mourne Mountains in Ireland. (The scientific name is *Emmelesia ericetata.*)



255. The Pretty Pinion (*Emmelesia blandiata*).

255. THE PRETTY PINION.—The antennæ are simple in both sexes; the fore wings are whitish-gray, with a nearly triangular blotch at the base, and a narrow, angled, transverse, median band, dark smoke-coloured; this band contains a conspicuous black discoidal spot above the middle, but just below this black spot the band is obscure, and sometimes looks as though washed out; beyond this band are three transverse markings, all of them smoke-coloured; the first of these is a pale and narrow waved line—the second a broad waved bar—the third is marginal; the hind wings are light smoke-colour, with a dark discoidal spot, and several pale waved lines below it.

"The CATERPILLAR is green, with a dorsal row of reddish triangles; spiracular line, yellowish green."—*Freyer, as translated in Stainton's Manual*, vol. ii., p. 82. It feeds on eyebright (*Euphrasia officinalis*).

The MOTH appears on the wing in May and June, and again in July and August. I took it rather abundantly at the end of June in Argyleshire, between Loch Fyne head and Loch Goil, but the specimens, even of the early brood, are much wasted; Mr. Birchall took it in the county Galway, and Dr. Wallace at Killarney. (The scientific name is *Emmelesia blandiata.*)

THE GENUS EUPITHECIA.

Before entering on the hitherto unattempted, and confessedly difficult, task of distinguishing from each other the little moths which constitute the Genus Eupithecia, or, as called by collectors, "Pugs," it is desirable to follow the course adopted by that eminent French entomologist, M. Guenée, in devoting a short space to general observations. A few years back, even so lately as 1859, when Mr. Stainton's Manual appeared, the caterpillars and life-histories of thirty-two British species had never been observed in this country, and those of eighteen species were absolutely unknown. It was probably this great deficiency of satisfactory and reliable information that induced the Rev. H. Harper Crewe to investigate and make known the life-histories of most of our British species. This gentleman's invaluable researches were published from time to time in the *Zoologist*, and it is with feelings of gratitude that I now publicly announce that I have received Mr. Crewe's permission to transfer them to these pages. Free access to Mr. Doubleday's matchless collection of the perfect insects, has also been granted me, without any reserve, and with a generosity that only finds a parallel in the liberality of this distinguished entomologist on all previous occasions, to whomsoever has sought assistance and instruction at his hands. No one, therefore, could possibly have better materials for a labour of this kind than I have, and my readers will please accept the assurance, once for all, that while I express my deep gratitude for the assistance I have received, I by no means desire to remove the responsibility of errors from my own shoulders; and it must be obvious that in a work partaking so largely of the character of a compilation, errors are very likely to creep in.

The caterpillars of the Eupitheciæ are various, in food, economy, shape, and colour. A few feed on leaves, but the greater number revel in the flowers of trees, shrubs, and herbaceous plants, devouring the petals, sepals, stamens, and pistils; and, in not a few instances, they penetrate the capsules, and feast

or the seeds themselves, making the seed-pod a dwelling place, in which they are effectually protected from all inclemencies of the weather. This propensity, or more properly speaking economy, is of course detrimental to the beauty of flowers, and, moreover, destructive to seeds and fruit. M. Guenée has devoted much time, thought, and attention to the investigation of these ravages, and has given a very complete account of them, as regards one of the more numerous species, an account to which I must again recur in a proper place.

When full-fed, the caterpillars usually descend to the ground, and there each constructs a delicate little cell, composed of silk and particles of earth, polishing the interior, but leaving the exterior in a rough and unfinished state, looking merely like a little lump of earth, and thus eluding the researches of mice, birds, beetles, and cockroaches, all of which evince great affection—cupboard love, it may be called—for the delicate morsel contained in the interior. A few of the species construct their cocoons in the seed-pods themselves, after consuming all the provender laid up therein by a bounteous nature for the preservation of the plant from generation to generation.

The chrysalis in this genus is remarkable for the brightness and vividness of its colours; greens, brown, and reds, of every shade, are of almost constant occurrence—these colours are not unfrequently found on the same chrysalis—and some so abound in ornamentation as to become really beautiful objects, and to form rather a striking contrast to the somewhat plain coloured chrysalids of the majority of geometers.

The moths themselves are peculiar in appearance, and are to be recognised at a glance; they sit by day on walls, fences, and trunks of trees, with the wings expanded, and so closely appressed to the surface that they seem part and parcel of the object on which they are resting; the fore wings are generally stretched out at right angles with the body, exposing almost the whole of the hind wings. The antennæ are short, and those of the males are very slightly fringed, or pectinated; in this respect I find them so uniform that I have thought it almost unnecessary to mention the antennæ at all in my descriptions of the numerous species. There is also a general similarity in the ornamentation of their wings, which consists of numerous transverse lines, of a different shade as to light or dark, but generally of the same colour, the difference being only in intensity. Longitudinal markings are of less common occurrence, but are sometimes present, and, intersecting the transverse markings, combine with them in covering the wing with the appearance of network. The transverse lines are not unfrequently confluent, and when two or three of them are thus united, I have described them as "bars," but when four or five are thus united, I call them "bands"—terms which are somewhat arbitrary, but which will I trust convey my meaning to the English reader. A discoidal spot is also generally present on the fore wings, its length is almost invariably greater than its breadth, and its position transverse; it is situated about half-way between the base and tip of the wing, and two-fifths of the way between the costal margin and the anal angle. I have observed that the ornamentation of the fore wings, of whatever character it may be, is usually continued or repeated in the hind wings; all the markings combine together to constitute a pattern, which would be incomplete if either wing were absent; generally, however, there is an evident etiolation, or diminution of colour, in the hind wings, so that the ornamentation of the hind wings, when contrasted with that of the fore wings, is as an echo, or, as the second rainbow when compared with the first—a repetition, with diminished intensity. The head, thorax, and body have the prevailing tint of the wings—generally some shade of brown, but it is not uncommon for the collar, scutellum, or a belt at the base of the body, to have a more conspicuous colour, as white, or bright rust-colour.

Owing to the small dimensions of these moths, their extreme similarity to each other, and the great number of species, the task

of distinguishing them, either by words or representations, is one of considerable difficulty; and a curious phenomenon observable, more or less, throughout the class Lepidoptera, finds an interesting illustration and exposition in this pretty genus; I allude to the existence of pairs of species, that is, that two species of which the caterpillars are totally unlike in food, form, colour, and size, shall so closely resemble each other when arrived at the perfect state, that it is found impossible to distinguish them. Confused by these difficulties, entomologists have very frequently united, under one name, two species which are perfectly and permanently distinct; and, still more frequently, have described, under new names, species which have been imperfectly and unintelligibly described under previous names. Herrich-Schaëffer, Guenée, and Doubleday have done their best to reduce into order the chaotic mass of names thus created, but it must be admitted that the synonymy of the species requires still more careful investigation before it can be permanently and satisfactorily settled.



256. The Netted Pug (*Eupithecia venosata*).

256. THE NETTED PUG.—The fore wings are smoky gray, with a tinge of wainscot brown; in some specimens this tinge prevails, in others the smoke-colour prevails; there are two transverse zigzag white bars, the first rather less than a third of the distance from the base towards the tip, the second rather more than two-thirds; both these bars are intersected throughout, and also bordered on each side by a black line; between these bars is a curved black line, unaccompanied by any white, and between the first bar and the base is a nearly straight black line, bordered outside with white; there are two longitudinal black lines connecting the two transverse bars, and five short black lines connecting the outer bar with as many transverse black lines on the hind margin; the hind wings are nearly of the same colour as the fore wings, with several darker transverse zigzag lines; the head, thorax, and body are also of the same colour; the thorax has a round black spot, and the body a black belt.

The CATERPILLAR, as described by Mr. Crewe, is by no means uncommon. "It is very easy to rear; when young, it is quite black, but when full fed, it is short, thick, and stumpy; its back is dull leaden gray, sparingly studded with minute white spots and short hairs; the belly and sides are dirty greenish white; the head is black. It feeds inside the seed-capsules of the bladder campion (*Silene inflata*), and the common red Lychnis (*Lychnis dioica*), and is full fed from the middle to the end of July. When about to assume the CHRYSALIS state, it comes out of the capsule and enters the earth, where it spins a very slight cocoon, and turns to a bright red chrysalis."

The MOTH appears on the wing from the beginning to the end of May, and at the beginning of June, and has been taken in many of our English and Irish counties. (The scientific name is *Eupithecia venosata*).



257. The Pinion-Spotted Pug (*Eupithecia consignata*).

257. THE PINION-SPOTTED PUG.—The fore wings are gray, with a glaucous tint, and having several transverse, dark brown, waved lines, three of them terminating on the costal margin in large dark blotches, the middle one of which is united to the discoidal spot in a manner that eclipses the latter, and renders it inconspicuous; the hind wings are pale gray, with a dark discoidal spot, and certain waved, but very indistinct, lines parallel with the hind margin.

The CATERPILLAR, so far as I am aware, has not been found in this country, but is well known on the continent, and is described by several European entomologists. Guenée say

of it: "The caterpillar is as beautiful as the moth; is of an apple-green colour, the incisions of the segments being yellow; the dorsal area is brighter, and is ornamented at the anterior margin of every segment with a small triangular red spot. It feeds in June, on fruit trees."

The MOTH appears on the wing in May and June, and has been taken in Herefordshire, Cambridgeshire, Gloucestershire, and Sussex, generally, if not exclusively, in apple orchards. It is extremely rare in collections, probably owing to its not having been sought at the proper times, and in the proper places; it settles on the trunks of apple trees generally just below the first branching, and owing to its exact similarity to the colour of the bark, is difficult to find, but may be induced to fly by giving the trunk a sharp stroke with a thick stick. (The scientific name is *Eupithecia consignata.*)



258. The Toadflax Pug (*Eupithecia linariata*).

258. THE TOADFLAX PUG.—The fore wings are very variegated; at the base is a smoky-black spot on the costa, almost surrounded by a paler space; then follows a transverse chestnut-coloured band, paler on the outside; then a broad black band, having a transverse discoidal spot, deeper black; this is bordered on each side by a white line; beyond this white line is a pale wainscot bar, then a chestnut bar, then a white line, and, lastly, a darker but somewhat variegated bar, occupying the hind margin; the hind wings are smoky gray, paler across the middle; the head is smoky black, the thorax chestnut brown; the body is black at the base, paler towards the extremity, with a medio-dorsal series of small black spots.

Mr. Crewe describes the CATERPILLAR as "short, stumpy, and slightly tapering towards the head; when young, it is bright yellow, with blackish dorsal spots; when full-fed, yellowish green, with a series of large dull olive, or rust-coloured dorsal spots or bars, running the whole length, and bordered on either side by a dusky olive line; the head is nearly black; the belly, dusky; the spiracles, black; the body is sprinkled with short whitish hairs, and here and there studded with black tubercles; the dorsal markings are frequently very indistinct, and sometimes wanting altogether, and the caterpillar is then of a uniform yellowish green. It feeds in August and September on the flowers and seeds of the common wild snap-dragon, or yellow toad-flax (*Linaria vulgaris*). It is uncertain in its appearance, being one year exceedingly abundant and the next very scarce. The CHRYSALIS, which is enclosed in an earthen cocoon, has the abdomen reddish yellow; the tip blood-red; the thorax and wing-cases, olive."

The MOTH appears on the wing in June, and has been taken in most of our English counties, but not in Ireland; in very warm seasons it is double-brooded. (The scientific name is *Eupithecia linariata.*)



259. The Foxglove Pug (*Eupithecia pulchellata*).

259. THE FOXGLOVE PUG.—The fore wings are very variegated; at the base of the wing a portion of the area is divided from the remainder by a black line; the upper portion of this area is almost black, the lower portion generally pale; this is followed by a white zigzag bar; then follows a transverse chestnut-coloured band, paler on the outside; then follows a broad dark band, having a transverse discoidal black spot, and many other markings; this band is bordered on each side by a white line; beyond this is a pale wainscot bar, then a second chestnut bar, then a white line, and, lastly, a darker, but variegated bar, occupying the hind margin; the hind wings are smoky gray, paler across the middle, and having certain indistinct darker zigzag lines; the head is dark; the thorax, chestnut-brown; the body, black at the base, and paler towards

the extremity, with a medio-dorsal series of small black spots.

Four varieties of the CATERPILLAR are thus described by Mr. Crewe :—

"*Var.* 1.—The ground colour is dull yellowish green; the central dorsal line is broad, continuous, and of a dull, dingy purple colour; the sub-dorsal line is also dull, dingy purple—it is narrow and interrupted on the anal segments; the spiracular line is narrow, broken, and dingy purple colour, marked with lines, or spots, of a deeper shade; the belly is whitish green, with a whitish central line; the whole body is strewed thinly with whitish hairs, and occasionally suffused and clouded with dull, dingy purple; in shape it resembles the caterpillar of *E. linariata*, in markings that of *E. centaureata*.

"*Var.* 2.—The ground colour is dull yellowish, or whitish green; the central dorsal line, dusky green; the segmental divisions are yellowish; the spiracular line is very narrow, and faint, dull green; the belly is whitish, without lines or markings.

"*Var.* 3.—The ground colour is pale primrose-yellow, slightly suffused with green; the central dorsal line dull faint green, nearly evanescent on the posterior segments; the sub-dorsal lines are dull faint green, much broken, having more the appearance of detached spots; the spiracular line is very faint, pale yellow; the belly whitish.

"*Var.* 4.—The ground colour is bright, yellowish green; the central dorsal line, pale olive, rather broad; the sub-dorsal lines, pale olive, and narrow; the spaces between the central dorsal and sub-dorsal lines are bright yellow; the spiracular line is dusky green, faint and broken; the belly is sea-green."

These caterpillars feed on the flowers of the common foxglove (*Digitatis purpurea*), and are full fed from the middle of July to the beginning of August. They spin together the mouth of the corolla, and, in the habitation thus constructed, devour the stamens, pistils, unripe seeds, and capsules; those flowers which contain a caterpillar remain on the stem long after the others have fallen; the caterpillars appear to seek the surface of the ground before undergoing their change, and the CHRYSALIS is found enclosed in a slight earthen cell; its thorax and wing-cases are transparent yellowish green, and its body reddish yellow; the divisions of the body and the tip are dark red.

The MOTH appears on the wing in May and June, and occurs in England, Scotland, and Ireland,—in almost every locality where the foxglove abounds. (The scientific name is *Eupithecia pulchellata.*)

Obs.—This beautiful little moth is so similar to the preceding, that many naturalists have declined to consider it distinct. Guenée hesitates to record it as a species, but is induced to do so from the fact of Mr. Doubleday's having bred a large number of *E. linariata*, without finding a single example of *E. pulchellata* amongst them. Our only English author on Lepidoptera, Haworth, appears to me to have described it as *linariata;* he certainly has not separated the two; still, from the difference of caterpillars, now distinctly ascertained, I cannot avoid the conclusion that the two species are perfectly distinct.



260. The Lime Speck (*Eupithecia centaureata*).

260.—THE LIME SPECK.—The fore wings are almost white, with two delicate transverse zigzag black lines, and a crescentic black spot between them; the costal margin has twelve or fourteen short brown markings, three or four of which, uniting with the discoidal, black spot, form a dark and conspicuous blotch; very similar markings occur on the inner margin; the hind margin is occupied by a fawn-coloured band, intersected throughout by a white line; the hind wings are nearly white, with several transverse brown markings on the inner margin; the thorax is nearly white; the body variegated with white, brown, and black.

The CATERPILLAR is long, rather slender, and tapering towards the head; it has a slightly wrinkled appearance. In colour it is very

variable. The following varieties are described by Mr. Crewe :—

"*Var.* 1.—Bright yellowish or blueish green, with a number of dorsal or sub-dorsal spots and lines of a darker shade, the dorsal markings very often forming a series of disjointed lozenge-shaped spots.

"*Var.* 2.—Uniformly yellow, yellowish, or bluish green, without any spots or markings whatever.

"*Var.* 3.—Greenish or pinkish-white, with a chain of deep red, trident-shaped dorsal spots, connected together by the central prong, and becoming confluent towards the head ; belly whitish, with a short red line or spot in the centre of several of the segments. It feeds in August and September upon the flowers of the ragwort (*Senecio jacobæa* and *S. erucifolius*), of golden rod (*Solidago Virgaurea Achillæa Millefolium*, hemp agrimony (*Eupatorium cannabianum*), *Pimpinella magna*, and *P. saxifraga*, *Silaus pratensis*, *Campanula glomerata*, and *Scabiosa columbaria*. Vars. 1 and 2 I have almost invariably found upon the three first-named plants, whilst those on the other flowers were Var. 3."

The CHRYSALIS is enclosed in an earthen cocoon. There are two varieties, one of which is of an uniform pale red colour. The perfect insect appears more or less from May to August.

The MOTH appears on the wing more or less abundantly from May to August ; it is one of our common species of Eupithecia, and is to be seen on every fence or park paling early in the morning, resting with expanded wings ; it certainly occurs more frequently in such situations, but also is to be found on trunks of trees, and stone walls ; it occurs in England, Scotland, and Ireland. (The scientific name is *Eupithecia centaureata.*)

261. THE BORDERED LIME SPECK.—The fore wings are white, clouded, and marked with smoky gray, and having a nearly circular discoidal spot, intensely black ; the smoky markings occupy the entire costal margin, except a square white spot situated at about two-thirds of its length ; the hind margin is also occupied by a broad smoky band, and the inner margin with a lighter smoky area, traversed throughout by delicate transverse white lines ; half-way between the central black spot and the hind margin is a transverse series of black dots, in some specimens scarcely perceptible, in others very manifest ; the hind wings are nearly white, clouded, and delicately barred with smoke-colour ; the crown of the head is white ; the collar brown ; the disk of the thorax white ; the body brown except near the tip, where it is white, the extreme tip being brown.

Three varieties of the CATERPILLAR are thus described by Mr. Crewe :—

"*Var.* 1.—Dull, dark, reddish brown ; the central dorsal line is dingy black, connecting a chain of dull black inverted, kite-shaped blotches, which become confluent on the anterior and posterior segments ; sub-dorsal lines dusky, slender, waved, uninterrupted, darker between the dorsal blotches ; median dorsal blotches at some distance from each other ; the border generally pale, and the centre dusky ; the spiracular line is dirty white, interrupted ; the head is bordered by a reddish line ; the belly is dusky at the edges, and pinkish white in the middle ; the central ventral line blackish ; the back and sides sprinkled with a few reddish hairs ; the central area dingy.

"*Var.* 2.—Pale reddish brown ; the central dorsal line and blotches being dingy olive ; the sub-dorsal lines dusky, very indistinct. In other respects resembling Var. 1.

"*Var.* 3.—Ground colour dark, dingy olive. In other respects like Var. 1."

The CHRYSALIS is enclosed in an earthen cocoon.

It feeds on the leaflets of the mugwort (*Artemisia vulgaris.*)

The MOTH appears on the wing in July, and occurs in some of our English counties, as also in Scotland and Ireland.

Obs. I possess a specimen of the male, in which the hind border has a series of eight ferruginous spots, and it differs also in several minor characters ; this is the *Disparata* of Hübner, the *Eupithecia succenturiata*, Var. *disparata* of Guenée.

262. THE TAWNY SPECK.—The central disk of the fore wings is bright ferruginous, the base, costal margin and hind margin being smoky brown, and a nearly circular discoidal spot is quite black; the costal margin is interrupted by numerous short, transverse, waved, gray lines, and the hind marginal band is intersected by a zigzag whitish line; the hind wings are smoke-coloured; the head, thorax, and body are also smoke-coloured; the body has a bright ferruginous belt near the base.

Two varieties of the CATERPILLAR are thus described by Mr. Crewe :—

"*Var.* 1.—Reddish brown; the central dorsal line pale olive, connecting a series of perfectly oval, dusky olive blotches, which become confluent on the anterior and posterior segments; the sub-dorsal lines are blackish red, interrupted; they are dark opposite the dorsal blotches, and pale and almost, if not quite, evanescent between them; the median dorsal blotches are pale in the centre, very close together, and almost confluent; the spiracular line is white; the back is thickly studded with minute white tubercles, and less thickly with whitish hairs; the belly is whitish, with a purplish central line.

"*Var.* 2.—Ground colour pale yellowish brown. Markings similar to Var. 1."

It feeds on the leaves, flowers, and seeds of the common yarrow (*Achillea millefolium*).

The MOTH appears on the wing in August, and occurs not unfrequently in most of our English counties, more especially in gardens, and Mr. Birchall reports it as common in the county Galway, in Ireland.



263. The Shaded Pug (*Eupithecia subumbrata*).

263. THE SHADED PUG.—The ground colour of the fore wings is white, intermixed, especially along the costal and hind margins, with smoke colour; there is a very small discoidal spot, but so indistinct that in some specimens it is scarcely to be perceived; the smoke-colour is arranged transversely, and interrupted by waved whitish transverse lines; the hind wings are almost white, with a smoke-coloured hind marginal band, but this band is also interrupted with whitish markings; the head, thorax, and body are mottled with white, and smoke-colour, and greatly resemble the fore wings.

Mr. Crewe describes two varieties of the CATERPILLAR as under :—

"*Var.* 1.—Very long and slender, tapering very much towards the head; ground-colour dull yellowish green; the central dorsal line is broad, dark green, narrower at the segmental divisions; the sub-dorsal lines are dusky, very narrow, and indistinct; the dorsal segmental divisions are orange; the ventral divisions yellow; the spiracular line is dusky green. On each side of the head and segment is a yellowish line.

"*Var.* 2.—The ground colour is dirty greenish brown; the central dorsal line dusky olive; the subdorsal lines are of the same colour; and the narrow posterior segments are reddish. In other respects it resembles Var. 1."

This singular long thin caterpillar I have been in the habit of taking at intervals for some years past in Buckinghamshire. It feeds in the open spaces between and near beech-woods, on the petals of almost any flower which happens to grow in such localities, for instance, *Centaurea nigra Knautia arvensis*, *Gentiana amarella*, and *G. campestris*, *Apargia hispida*, *Origanum vulgare*, *Prunella vulgaris*, *Galium mollugo*, &c., preferring, perhaps, *Apargia hispida*, and *Crepis taraxicifolia*. It is full-fed at the end of August and throughout September.

The CHRYSALIS is enclosed in an earthen cocoon, and has the thorax and wing-cases dark green; the body is ochreous, with the tip dusky red.

The MOTH appears in June, and is not very uncommon in England; and Mr. Birchall informs us that it is common in the county Galway, in Ireland. (The scientific name is *Eupithecia subumbrata.*)



264. Guenée's Pug (*Eupithecia pernotata*).

264. Guenée's Pug.—The four wings are of a delicate pearly gray colour, with an ochreous tinge diffused uniformly over the entire surface, which is also traversed by numerous transverse lines, all of them more or less waved, and more or less oblique; these transverse lines are paler than the ground-colour, but not very conspicuously so, neither are they quite continuous; the wing-rays are spotted with dark brown; there is also a series of transverse dark markings between the costal and sub-costal rays, and a slender interrupted dark brown line on the hind margin; the hind wings are of a pearly gray colour, without the ochreous tint, but their markings are very nearly the same as those of the fore wings. I am unable to find the usual discoidal spot on either of the wings; the fringe is spotted; the head, thorax, and body are ochreous-brown, speckled with darker brown, and there is an evident darker belt at the junction of the thorax and body: it is a large and interesting species; although the colours are very subdued, and present no strong contrast, the pattern, so to speak, is very elegant; when fresh from the chrysalis the specimen described had a distinct reddish marginal band on all the wings.

The only specimen I have seen is in Mr. Doubleday's collection; it was bred from a caterpillar which was found by Mr. Machin, feeding on the flowers of the golden rod. (The scientific name is *Eupithecia pernotata.*)



265. The Lead-coloured Pug (*Eupithecia plumbeolata*).

265. The Lead-coloured Pug.—All the wings are lead-coloured, with slightly darker, delicate, transverse waved lines, but these are very indistinct, and tend rather to increase than diminish the plain lead-coloured appearance of the insect; there is a splendid interrupted black line on the hind margin, just within the fringe; the hind wings are rather paler than the fore wings. I am unable to find any trace of the discoidal spot on either of the wings. The head, thorax, and body are of the same colour as the fore wings.

The caterpillar is thus described by Mr. Crewe:—

"Somewhat short and stumpy; the ground-colour is pale yellowish green; the central dorsal line broad, continuous, dull purplish red, enlarged into a somewhat pear-shaped blotch on the centre of each segment; subdorsal lines narrower, sinuous, dull purplish red; dorsal and subdorsal lines sometimes merged into one, leaving the whole back and sides suffused with purplish red; a few slender yellowish hairs sprinkled over the dorsal and lateral segments; the belly is naked, pale, dull greenish yellow; central ventral line wanting; subventral lines narrow, purplish red. It feeds on the flowers of the common cow-wheat (*Melampyrum pratense*); when quite young on the stamens only, afterwards on the whole corolla tube; it is full-fed from the middle of July to the middle of August. The chrysalis is enclosed in a slight cocoon, either in a dry corolla tube, or in the surface of the earth; its general colour is golden yellow, with the abdominal divisions and tip red."

The moth appears on the wing at the end of May, and occurs in most of our English counties, also in Scotland; and Mr. Birchall informs us it is common at Killarney, in Ireland. (The scientific name of this homely little moth has been changed a great many times; it has been called *Plumbeolata*, *Pusillata*, *Scabiosata*, *Begrandaria*, and *Valerianata*, but I think the oldest intelligible description is Haworth's, under the name of *Eupithecia plumbeolata.*)



266. Haworth's Pug (*Eupithecia isogrammata*).

266. Haworth's Pug.—All the wings are brownish gray, the colour being given by numerous waved and closely approximate

transverse lines, which are alternately dark and light; the hind wings are, as usual in the genus, less clearly marked than the fore wings; the discoidal spot is absent from all the wings; the head and thorax are of the same colour as the fore wings, but the body has a broad rust-coloured, or fulvous belt at the base, which always fades, and often entirely disappears, when the specimen has been some years in a cabinet.

Mr. Crewe says:—"The CATERPILLAR seems to be little known, and has not, I think, ever been described. I have, however, taken it in plenty wherever its food-plant occurs: it is very short and stumpy, the ground-colour pale blueish, or yellowish green, with three horizontal dorsal stripes of a darker shade; these stripes are often very indistinct, and sometimes altogether wanting; the head is dusky, spotted with olive, and the body sparingly studded with minute black dots: it is full-fed from the middle of July to the middle of August. It feeds inside the unopened flower-buds of *Clematis vitalba*, commonly known as the Traveller's Joy. When nearly full-fed it frequently feeds among the stamens of the expanded flower, and may then be beaten into an umbrella: it also feeds on the common white garden clematis. The presence of the caterpillar may generally be detected by the blackened appearance of the flower-buds. When it has eaten the inside of one bud, it comes out and bores into a fresh one: I have frequently seen it busily engaged in this operation. The CHRYSALIS is enclosed in a very tightly-constructed earthen cocoon; the thorax and wing-cases are green, and the body red."

The MOTH appears on the wing in June, and the beginning of July, and is abundant among *Clematis vitalba:* it flies about with extreme rapidity in the hot sunshine, and it is almost invariably wasted when caught. It occurs in many of our English counties, and Mr. Birchall says that it is common at Killarney, in Ireland. Of course the range of its food-plant rules the geographical distribution of the species. (The scientific name is *Eupithecia isogrammata.*)

Obs. Haworth was the first author who characterised this species, but he considered it a variety of *E. piumbeolata*, the insect last described, and therefore did not name it. Mr. Doubleday very early saw that this was an error, and gave it the name of the distinguished entomologist who discovered it, namely, *E. Haworthiata:* it has, however, since been identified as the *E. isogrammata* of Treitschke, and, in accordance with the rule of priority, we must retain that name.



267. The Marsh Pug (*Eupithecia pygmæata*).

267. THE MARSH PUG.—The fore wings are brownish gray, with numerous paler and darker closely approximate waved transverse lines; and it is these which communicate the general tint to the wing; several of the pale lines become white in the costal margin, and are then more conspicuous, but this more conspicuous portion of the line is very short; there is a delicate black line on the extreme hind margin; very near the hind margin, and parallel therewith, is a waved but rather indistinct pale line, which terminates in a white spot at the anal angle; there is no distinct discoidal spot, and, indeed, scarcely a trace of one: the hind wings, head, thorax, and body are nearly of the same colour as the fore wings: it is altogether an extremely plain-looking insect.

The MOTH appears on the wing in June, but is not very common; it has been taken in both the northern and southern English counties, also near Glasgow and Ardrossan, in Scotland, and in the counties Galway and Wicklow, and at Portmarnock, in Ireland: it flies by day. (The scientific name is *Eupithecia pygmæata.*)

268. THE EDINBURGH PUG.—The fore wings are smoky gray inclining to brown, and adorned, especially in the female, with darker transverse markings in the disk, and a very conspicuous transverse discoidal spot; there are a number, generally eight, short transverse

markings both on the costal and inner margin, a white spot in the anal angle, and paler as well as darker markings on all the wing-rays; and, moreover, certain transverse gray markings which alternate with the darker markings on the costal as well as inner margin; there is a very perceptible but not large discoidal spot: the hind wings are brownish gray, with a small discoidal spot, and the hind margin is darker, which makes an extreme marginal pale line very conspicuous; the fringe is alternated with two shades of brown: the head, thorax, and body are gray-brown, the body having the margins of the segments much darker, and each terminating in a delicately white and very narrow belt; the contrast of the very dark brown and pure white makes this annular ornamentation the more conspicuous.

The CATERPILLAR is thus described by Mr. Crewe:—"rather short and stumpy, altogether a most dumpy-looking caterpillar; of the same thickness from head to tail; the ground-colour is grass-green; the central dorsal line is dark green and slender, the tip always purplish brown or purple; the subdorsal lines are broader, dark green, edged anteriorly with pale straw-colour, and posteriorly sometimes with purple; the spiracular line is waved, pale yellow or straw-colour; the head is slightly bifid, and when at rest, curved inwards; it is of a dusky purple colour, sometimes almost black; the segmental divisions are yellowish. It feeds on the common juniper (*Juniperus communis*), and is found full-fed from the middle to the end of September."

The MOTH appears on the wing in May, and has been taken by Mr. Logan near Edinburgh, but I believe neither in England nor Ireland. (The scientific name is *Eupithecia helveticata.*)

Obs. Mr. Crewe observes that this species is often a month or six weeks earlier than *Eupithecia arceuthata;* also that the caterpillar is shorter and more stumpy, and its colour duller.

269. FREYER'S PUG.—The fore wings are brownish gray, with four pale waved bars; three of them are rather broad and double; that is to say, they are intersected throughout by a slender dark line; the fourth, nearer to the hind margin, is single and zigzag; the extreme hind margin is pale, and the fringe is dark interiorly, and paler exteriorly; the boundary of the two tints being clearly defined; there is generally no very distinct discoidal spot, but there are two longitudinal series of white dots, extending from the base of the wing to the third double band; one of these is about midway between the costal and inner margin, the other is half-way between this first and the inner margin: the hind wings are brownish gray, with a short double transverse bar originating at the inner margin, and scarcely reaching the middle of the wing, and half-way between this and the hind margin is a single pale bar extending entirely across the wing; the extreme margin and fringe are as in the fore wings, and there is a discoidal spot slightly indicated; the head, thorax, and body are gray-brown.

The CATERPILLAR is thus described by Mr. Crewe:—"Short and plump, of the same thickness from head to tail; the ground-colour is grass-green; the central dorsal line dark green; the subdorsal lines pale yellow, or yellowish white, posteriorly dark green; the spiracular line is white or yellowish; the segmental divisions yellow; the head is somewhat bifid, when at rest it is slightly curved inwards, and invariably of a uniform dull green colour; the belly is bright green; the central ventral line is yellow, and the tip of the central dorsal line always dark green; the spaces between the subdorsal and spiracular lines are darker green than the rest of the body. It feeds from the end of September to the middle of November, and is seldom full-fed before the middle of October; it will feed on cypress if reared from the egg in confinement, but in a state of nature it feeds on the common juniper (*Juniperus communis*) The CHRYSALIS is enclosed in a slight earthen cocoon: its wing-cases are transparent yellowish green; the thorax and body being rather paler; the tip of the body is dull red."

The MOTH appears on the wing in May; the caterpillar has been obtained in Bucking-

hamshire. (The scientific name is *Eupithecia arceuthata*).

1*st Obs.*—Staudinger, in his catalogue of European Lepidoptera, unites Eupithecia arceuthata of Freyer with *E.helveticata* of Boisduval: this opinion is shared by many entomologists; but as the caterpillars seem so distinct, it is desirable to keep them separate.

2*nd Obs.*—It appears to be a most variable species—some specimens having the discoidal spot very large, while in others it is scarcely perceptible.

270. The Satyr Pug.—The fore wings are long, and rather pointed: they are of a brownish smoky gray colour, with numerous paler waved transverse lines; one of these near the hind margin is paler and much more distinct, although less continuous than the rest, being broken up or divided into whitish spots, which sometimes form a zigzag series; one of these spots near the anal angle is larger and more conspicuous than the rest: there is an evident, but not very conspicuous, discoidal spot, and the wing-rays in perfect specimens are dotted with dark smoke-colour: the hind wings are obscure smoky gray, with indications of transverse waved lines, and are perceptibly darker towards the hind margin; the head, thorax, and body are of the same colour as the fore wings.

Var. 1.—Three varieties of the caterpillar are thus described by Mr. Crewe:—"Ground-colour, pale yellowish green, with the segmental divisions yellow; the central dorsal line is dusky green. Down the centre of the back is a series of Y-shaped dusky green blotches, edged with purplish brown, and becoming confluent or merged in the central line, on the anterior and posterior segments; the subdorsal lines are very slender and indistinct, and of a dusky green colour; the spiracular line is yellow. Between the subdorsal and spiracular lines is a row of small slanting purplish blotches; the back is studded with very minute yellowish tubercles.

Var. 2.—The back is greenish white; the central dorsal line pinkish or rose-colour; the subdorsal lines the same. Down the centre of the back is a series of large rose-coloured and rusty red goblet-shaped blotches, becoming faint or merged in the central line on the anterior and posterior segments; the spiracular line is waved and rose-coloured; the subdorsal and spiracular lines connected by a number of slanting rose-coloured streaks; the belly is pale sea-green, or greenish white, with a central white line; the back is studded with numerous small white tubercles.

Var. 3.—The whole of the back is suffused with rose-colour; the subdorsal lines are yellowish; the dorsal blotches are edged with yellow. The spiracular line is interrupted with yellow patches; the belly is greenish white; the ventral segmental divisions are white.

This caterpillar tapers considerably towards the head; it is very local, but occurs in plenty in some parts of Buckinghamshire, where, however, it is confined to the open spaces between and near the beech woods. It feeds upon the petals of almost any flower which happens to grow in the locality, *e.g.*, *Centaurea nigra*, *Knautia arvensis*, *Gentiana amarella*, and *G. campestris*, *Apargia hispida*, *Origanum vulgare*, *Prunella vulgaris*, *Galium mollugo*, &c., preferring the two first-named. It is full-fed in September. The chrysalis, which is enclosed in an earthen cocoon, has the thorax and wing-cases golden yellow, suffused with red. The divisions of the segments and the tip of the body are red."

The moth appears on the wing in June, and occurs plentifully in Buckinghamshire, and is said to have been found in the north of England and in Scotland. Mr. Birchall says that it is generally distributed and common in Ireland. (The scientific name is *Eupithecia satyrata.*)

271. The Pauper Pug.—Fore wings lead-coloured, with darker transverse lines, four of these are equidistant, and near the base of the wing a fifth originates on the inner margin, and terminates in the discoidal spot, which is very distinct: beyond this is a double line twice elbowed, and again beyond this a single line; the hind-marginal area is intersected by a zigzag whitish line; the extreme margin of the wing is delicately edged with black, and the basal half of the fringe is

spotted: the hind wings are of nearly the same colour as the fore wings, with a crescentric discoidal spot; the hind margin and fringe are as in the fore wings; the head, thorax, and body are of the same colour as the fore wings; the body has a medio-dorsal series of double black spots.

The MOTH appears on the wing at midsummer, and is said to have been taken in Wales. It seems to be *very* rare. I have never seen a specimen, but there is one in the cabinet of Mr. E. C. Buxton. (The scientific name is *Eupithecia egenata.*)

Obs. In this instance, my description is not taken from the insect itself, but chiefly from Herrich-Schaëffer's figures. (Geom. Europ. 279, 280.)



272. The Gray Pug (*Eupithecia castigata*).

272. THE GRAY PUG.—The fore wings are smoky gray, with several paler gray waved transverse lines, three of which are double, that is, intersected throughout by a distinct darker line; the fourth line nearest the hind margin, is single and more interrupted, and zigzag; it is of the same gray colour as the rest, and has a very indistinct pale spot at the anal angle; there is a small and rather inconspicuous discoidal spot, and a slender interrupted black line on the hind margin; the fringe is smoky gray, and longitudinally, but indistinctly intersected by a darker line; the hind wings are paler at the base, darker towards the hind margin, and have a small, but distinct, discoidal spot; the head, thorax, and body are smoky gray.

The CATERPILLAR is thus described by Mr. Crewe:—"Long, slender, and tapering; the ground colour is pale or dusky olive, or reddish brown, with a chain of dusky lozenge-shaped dorsal spots, becoming confluent on the anterior and posterior segments; the segmental divisions are reddish; the body is thickly studded with minute white tubercles, and clothed more sparingly with short bristly hairs; the belly has a central blackish or purple line running from tip to tail. It feeds indifferently on almost every tree, shrub, and flower, in August and September. In almost every particular, it closely resembles the caterpillar of *E. vulgata.* The CHRYSALIS is enclosed in an earthen cocoon; its body is slender, tapering, and of a reddish or greenish yellow; its thorax and wing-cases yellow; the latter more or less suffused with green."

The MOTH appears on the wing in May, and occurs in most of our English counties, and also in Scotland, and Mr. Birchall says, that in Ireland it is common and generally distributed. (The scientific name is *Eupithecia castigata.*)



273. The Golden Rod Pug (*Eupithecia virgaureata*).

273. THE GOLDEN ROD PUG.—Fore wings brown-gray with a slight tendency to fulvous in the middle; on the costal margin are several, four to eight, short transverse black markings, which extend distinctly only as far as the subcostal ray, but are slightly indicated on the disk of the wing; there is a pale, irregular, and interrupted line parallel with the hind margin, and this terminates in a rather conspicuous gray mark; all the wing-rays are more or less dotted with black; there is also a slender interrupted black line on the hind margin, and the discoidal spot is dark and conspicuous; the hind wings are of much the same colour as the fore wings, but are paler on the costal margin, and have a number of short transverse lines on the inner margin.

The following description of the CATERPILLAR was written by Mr. Crewe:—

"Fulvous, with a series of black dorsal triangular spots; becoming confluent towards the head, and faint or altogether evanescent on the caudal segment. On either side is a row of conspicuous, slanting whitish or yellowish stripes, forming a sort of margin to the dorsal spots; the belly is dusky, reddish in

the centre, and having a dusky central line running the whole length; the body is studded with variously-sized white tubercles, and is thinly clothed with short hairs. It feeds upon the flowers of the golden rod (*Solidago virgaurea*), in August and September. I have found it by no means rare in the Kentish woods, where the underwood is of one or two years' growth, and the golden rod has room to grow and flower freely. In confinement this caterpillar will feed freely upon ragwort (*Senecio jacobœa*) and *S. Palustris*. The CHRYSALIS, which is enclosed in a slightly-spun earthen cocoon, is very distinct from all the rest of the family. The thorax is yellowish green, with a very accurately and distinctly defined border, and looks almost as if set in a frame. When examined with a glass, some singular dark spots and markings are seen, which give it very much the appearance of a skull. The body is a yellowish red, with two indistinct interrupted dorsal, and two more distinct subdorsal dusky lines; the wing-cases are yellowish olive, streaked with dusky markings, and having the wing-rays very prominent."

The caterpillar is rather slender, and tapers towards the head. In general appearance it resembles *E. castigata* and *E. vulgata*.

The MOTH appears on the wing in May and the beginning of June, and has been taken by Mr. Doubleday at Epping: it has been reported from other southern localities, and is common near Liverpool, but has not occurred in Scotland or Ireland. (The scientific name is *Eupithecia virgaureata*.)

Obs. This insect has for many years stood under the name of *E. pimpinellata* in our cabinets, and under that name Mr. Crewe has described the caterpillar; but this gentleman was, I believe, the first to suspect and to point out the error, for he appends to his description the following judicious remarks:—"I am inclined to suspect that this insect has been wrongly named; I have constantly and most closely examined both the flowers and seeds of *Pimpinella magna* and *P. saxifraga*, but could never detect the slightest trace of the caterpillar, but I have repeatedly beaten it from the flowers of the golden rod, and from that plant alone, although both species of *Pimpinella* are common in this locality." I may state that Mr. Doubleday entirely agrees with this change of name, which I trust will hereafter be generally adopted.

274. THE WHITE-SPOTTED PUG.—The fore wings are brown, minutely speckled with darker brown, and the wing-rays are spotted alternately dark and pale; near the middle of the wing is the usual discoidal dark spot very conspicuous, and almost round, and below the hind margin is an interrupted transverse series of white markings, three of which, situated towards the anal angle, are very conspicuous; between this series and the fringe the wing-rays are entirely dark; the hind wings are brown, and very minutely speckled with darker brown, and these have also a transverse and almost marginal series of white markings, terminating in a conspicuous white spot near the anal angle; the head, thorax, and body are brown; the thorax being marked with a white bar across the middle, and a white triangle where it joins the body.

Mr. Crewe has described two varieties of the caterpillar as under:—

"*Var.* 1.—Ground colour, pale lemon yellow, more or less suffused with rich brown. Down the centre of the back is a series of deep brown lily-shaped spots, bordered on either side by a slender sub-dorsal line of the same colour; on each side is a row of slanting bright yellow stripes and deep brown blotches; the belly is greenish yellow; the central ventral line deep brown; the sub-ventral line deep brown, much broader than the central one. Body studded with numerous white tubercles.

"*Var.* 2.—Ground colour pale yellowish green; down the centre of the back is a series of semi-lozenge-shaped dusky brown spots, connected by a central line of the same colour, and becoming indistinct on the posterior, and confluent on the anterior segments; sub-dorsal lines dusky, indistinct. On each side is a series of dusky blotches; the central ventral line dusky, interrupted; the whole body, especially the back, is studded with minute white tubercles, and a few short blackish

hairs. The dorsal, sub-dorsal, and lateral blotches, spots, and lines are sometimes almost or entirely wanting, leaving the caterpillar of a uniform pale yellowish green.

"This caterpillar tapers towards the head, and has a slightly wrinkled appearance. When full-fed and ready to spin it turns pink."

It feeds on the blossoms of the wild angelica (*Angelica sylvestris*), and common hog-weed (*Heracleum sphondylium*). The CHRYSALIS is enclosed in a slight earthen cocoon; its thorax is yellowish green, and the wing-cases dark green, furrowed and wrinkled; the body is tapering, rough, and of a dull red colour; it has a slight ventral protuberance.

The MOTH appears on the wing in May and June, and has been taken in Suffolk, Kent, and Derbyshire, but not in Scotland or Ireland. (The scientific name is *Eupithecia albipunctata*, under which it was first described by Haworth (*Lep. Brit.* 360), but Herrich-Schæffer (Supp. p. 77, fig. 461) has called it *E. tripunctaria*, and Guenée (*Uran. et Phal.* p. 315, No. 1,412) and Mr. Crewe (*Zool.* 7,567 and 7,762) have adopted that name; the older name must be restored.)

275. THE VALERIAN PUG.—"All the wings are ashy brown, with the ordinary discoidal spot in the centre of the fore wings, and a very indistinct pale waved line at the hind margin; the hind wings are pale brown. with very faint waved lines."

The CATERPILLAR is thus described by Mr. Crewe: "Rather short, but tapering very considerably towards the head; the ground colour is bright green, and very translucent; the central dorsal and sub-dorsal lines are dark green but varying considerably in breadth, and in intensity of colour; the segmental divisions are yellow; the belly is generally destitute of markings, but is occasionally traversed longitudinally by two slender faint sub-ventral lines, rather darker than the ground colour; the spiracular line is whitish green; when young, the ground colour is greenish white; it feeds on the flowers and seeds of the common valerian (*Valeriana officinalis*), in woods and osier beds, and is full-fed from the middle of July to the middle of August.

The MOTH appears in May, and occurs in Buckinghamshire, Dorsetshire, Derbyshire, Devonshire, and Herefordshire. (The scientific name is *Eupithecia valerianata.*)

Obs.—This insect is the *Eupithecia viminata* of Mr. Doubleday formerly, but Hubner's is the prior name, and is very appropriate, as the caterpillar feeds on valerian. I have copied Mr. Doubleday's original description of the moth.

276. THE LARCH PUG.—The fore wings are long, rather pointed, and of a dark, smoky-gray colour, with several transverse pale gray markings, and a distinct transverse discoidal black spot; the principal pale markings are a vague band just outside the black discoidal spot, a waved bar beyond this, which is double, or intersected throughout by a slender dark smoke-coloured line, and a single slender line, half-way between this and the hind margin; there is a delicate interrupted black line on the hind margin itself, and the fringe is very indistinctly spotted with two shades of gray; the hind wings are much the same colour as the fore wings, but paler at the base; they have a rather indistinct crescentic discoidal spot, and a double series of gray dots parallel with the hind margin; there is the same interrupted black line on the margin as in the fore wings, and the fringe is indistinctly spotted; the head, thorax, and body are sprinkled over with the two shades of gray, the dark smoky-gray greatly prevailing; at the base of the thorax is a semi-circular whitish spot.

Mr. Crewe has described two varieties of the caterpillar as under:—

"*Var.* 1.—The ground colour is bright grass-green, somewhat darker on the centre of the back; the central dorsal line is dark green; the anal tip of the central dorsal line reddish; the sub-dorsal lines are wanting, or so faint as to be scarcely visible; the spiracular line is whitish, or pale straw-colour; the segmental divisions are yellowish; the belly is whitish, with a dark green central line; it is a long slender caterpillar, tapering towards

the head, and a good deal resembles in appearance the caterpillar of *E. fraxinata*.

"*Var.* 2.—The ground colour is yellowish red, or reddish buff; the central dorsal line brownish olive; the sub-dorsal lines brownish olive, occasionally very faint; the spiracular line is pale greenish yellow; the anal tip of the central dorsal line reddish; the belly is whitish, with a dusky central and two broad lateral lines. It feeds on larch and spruce fir, and is full-fed at the end of July.

"The CHRYSALIS is enclosed in a slight earthen cocoon; it is rather long and slender; the thorax is yellowish olive; the wing-cases deep green; and the body yellowish green, tinged with red; the abdominal divisions and tip red."

The MOTH appears on the wing at the end of May; it was discovered by Mr. Eedle, in Surrey, only a few years ago, and its name ascertained by Mr. Doubleday; it is now found to be very abundant in fir plantations in the south of England, but has not yet been recorded from the north of England, from Scotland, or from Ireland. (The scientific name is *Eupithecia lariciata*.)



277. The Triple-Spot Pug (*Eupithecia trisignata*).

277. THE TRIPLE-SPOT PUG.—The fore wings are gray, tinged with ochreous, and having a number of transverse bent lines of a darker colour; three of these originate about the middle of the costal margin, in as many black spots, and below these is situated the usual discoidal spot which is nearly round, and very conspicuous; the hind wings are slightly paler, but very similar; the under side of this little moth has a discoidal spot, rather conspicuously placed near the centre of each wing.

The CATERPILLAR is thus described by Mr. Crewe: "Rather short and stout, tapering but slightly towards the head; the ground colour is pale green; the central dorsal and sub-dorsal lines dark green, the latter broader than the former; the spiracular line is waved, and of a whitish or yellowish colour; the segmental divisions are yellowish; the head is black, and, when at rest, curved considerably inwards; the anal tip of the central dorsal line is purplish; the back is wrinkled, and sprinkled with a very few short bristly hairs; the belly is green, with a central yellowish line. The CHRYSALIS is enclosed in an earthen cocoon; its thorax is pale olive; its wing-cases are pale olive, and very transparent; its body tapering, and of a reddish yellow colour; its tip and segmental divisions blood-red." It feeds on the flowers of the wild angelica (*Angelica sylvestris*).

The MOTH appears in June and July, and occurs in Buckinghamshire and Derbyshire, but has not been recorded from Scotland; Mr. Birchall obtained it at Howth, in Ireland. (The scientific name is *Eupithecia trisignata*.)

278. THE DWARF PUG.—The fore wings are very strongly marked; the ground colour is pale gray, and there are numerous transverse, irregular, interrupted bars of a dark brown colour; the first of these is more conspicuous than the rest; the second is interrupted in the middle; the third includes the usual discoidal spot; and there is also a series of distinct black lines on the hind margin, just within the fringe, which is alternately dark and pale; the hind wings are gray, with waved darker bars and a discoidal spot; they have also a marginal series of dark lines; the head, thorax, and body are grayish brown, and speckled; the body has a black belt near the base.

The CATERPILLAR is thus described by Mr. Crewe: "Long, slender, and tapering considerably towards the head; ground colour orange red, or dull ochreous green; central dorsal line dusky olive, often apparent on the anterior segments; sub-dorsal line of the same colour; spiracular line yellow; segmental divisions orange; central ventral line yellowish. It feeds on spruce fir (*Pinus abies*), and is full-fed the first week in July. The CHRYSALIS is enclosed in a slight earthen cocoon; it is slender and delicate, of a pale ochreous

yellow colour, with black and prominent eyes; the upper edge of the wing-cases is bordered with two black spots, and the lower edge by a slender blackish line."

The MOTH appears on the wing in May, and is then very common at West Wickham Wood, in Surrey, and has been taken in Devonshire, but I think not in the north of England, Scotland, or Ireland. (The scientific name is *Eupithecia pusillata.*)



279. The Marbled Pug (*Eupithecia irriguata*).

279. THE MARBLED PUG.—The fore wings are pale gray, almost white, with several dark brown markings; these are, *first*, a small triangular blotch at the base of the wing; *secondly*, an elbowed bar near the base; *thirdly*, a triangle on the middle of the costal margin; the apex of this brown triangle joins the black discoidal spot; and *fourthly*, a broad marginal band intersected by a pale gray zigzag line, which is tolerably perfect on the costal margin, but broken up towards the anal angle; the hind wings are whitish gray, with a few darker markings, but nothing resembling those on the fore wings. The thorax and body are prettily variegated with the two shades of colour prevalent on the wings.

The MOTH appears on the wing in April and June, in the New Forest, in Hampshire, but seems to be rare. (The scientific name is *Eupithecia irriguata.*)

280. THE PIMPINEL PUG.—The fore wings are elongated, but less lanceolate than those of *E. innotata*, and the hind wings are much more rounded than in that species; they are bright gray, with a slight tint of reddish brown or clay-colour, especially on the lower part of the wing, and before the subterminal line, where it forms almost a band; the discoidal spot is large and very black, and the usual lines, which are more or less distinct, originate in black costal spots; the subterminal line is indistinct and irregular, and there is no white spot at the anal angle; the hind wings are light, with rudiments of lines and a band, especially on the inner margin, and the second and third wing-rays are intersected with black and white; the discoidal spot is very distinct; the body has a red band on the second segment.

Mr. Crewe thus describes the CATERPILLAR:

"It is long, rather slender, and tapering towards the head. There are two varieties:

"*Var.* 1.—Is green, with three purple dorsal lines, the central one of which is broad and distinct, expanding considerably on the anal segment; the two side ones are very indistinct; the head and prolegs are purple; the segmental divisions and spiracular lines yellowish; the belly is green; the back studded with a few minute white tubercles, interspersed here and there with a black one.

"*Var.* 2.—Is of a uniform purple, with two lines of a deeper shade on each side of the back. It feeds, as far as my experience goes, exclusively on the flowers and seeds of the lesser Burnet saxifrage (*Pimpinella saxifraga*), and is full-fed throughout the month of September, and occasionally at the beginning of October. It prefers the hedge sides and banks. It is fearfully infested with ichneumons, not above one in ten escaping. The CHRYSALIS is enclosed in an earthen cocoon; there are two varieties, the one yellowish green, the other red. This caterpillar is by no means rare in the eastern counties. I have also taken it in Derbyshire."

The MOTH appears on the wing twice in the year, in April and August. (The scientific name is *Eupithecia pimpinellata.*)

Obs.—Mr. Crewe has described this larva under the name of *E. denotata*, and M. Guenée has described the perfect insect under the same name; but Mr. Doubleday believes this species to be the *Pimpinellata* of Hubner, and the food-plant as well as the characters of the perfect insect which I have copied from Guenée, go to prove the justice of this conclusion.

281. THE ASH-TREE PUG.—Fore wings very long, narrow, and rather pointed; smoky-brown, with a distinct although very narrow

crescentic discoidal spot; between the costal and sub-costal wing-rays there are a number of short transverse markings, which are elbowed when they reach the latter, and then are directed for a short distance only towards the tip of the wing; the wing-rays are spotted with brown and pale gray; those six which run parallel with each other to the hind margin are very dark, and each is interrupted by a pale gray spot, which six spots form an oblique series from the costal margin near its tip to the inner margin; near the anal angle there is a slender interrupted black line on the extreme hind margin, with which the dark wing-rays are united; the hind wings are pale-brown, with a small circular discoidal spot, and a number of very indistinct transverse waved lines near the hind margin; there is a very slender black line on the margin itself; the fringe is dark and intersected by a slender pale line; the head, thorax, and body are dark brown, and somewhat spotted.

The CATERPILLAR is thus described by Mr. Crewe: "Long, smooth, rather slender, and tapering towards the head; the ground colour is uniform dark green; the central dorsal line faint purplish, and enlarged into a very distinct purple spot on the anal appendage; the segmental divisions are yellow; the spiracular line is waved and yellowish; the belly is wrinkled and whitish; the central ventral line, dark green. A variety occurs, in which the central dorsal line is supplied by a series of dusky triangular blotches, very faint, or altogether evanescent, on the anterior and posterior segments; on each side is a row of slanting faint yellow stripes, tinged with pink. It feeds upon ash, and is full-fed at the end of August and beginning of September. The CHRYSALIS is enclosed in a slight cocoon, under moss, on the trunks of ash-trees; it is long, slender, and tapering, with the thorax and wing-cases dark olive; the body is still darker, and almost black, tinged posteriorly with red."

The MOTH appears on the wing in June and July. (The scientific name is *Eupithecia fraxinata.*)

1*st Obs.*—The caterpillars, in confinement, will feed on the flowers of *Laurustinus.*

2*nd Obs.*—Mr. Crewe at first supposed this to be the caterpillar of *Eupithecia innotata,* and described it as such in the "Zoologist."

282. THE OCHREOUS PUG.—The fore wings are rather pointed, and of a pale wainscot brown colour, with a distinct oblong discoidal spot, a slender interrupted black line on the hind margin, and seven or eight faintly indicated waved, oblique transverse dark lines, all of which originate in dark transverse spots, which connect the costal and sub-costal rays; the hind wings are very pale, with a gray discoidal spot, and a delicate dark line on the hind margin; the fringe of all the wings is very pale; the head, thorax, and body are of the same colour as the wings. It is altogether a faded or bleached-looking insect.

The CATERPILLAR is thus described by Mr. Crewe: "Long, slender, and tapering considerably towards the head; the ground colour is pale greenish yellow, or yellowish red; the central dorsal line, dusky reddish brown or olive, frequently very indistinct or wholly evanescent, except on the capital segments; the sub-dorsal lines, pale yellow; the belly is greenish yellow; the central ventral line, yellow; the sub-ventral line, reddish brown."

The EGGS from which the caterpillars above described were reared, were laid upon the wild juniper and cypress, and the caterpillars were full-fed from the middle to the end of July.

The species is double-brooded, the MOTH appearing on the wing in May and August; it is by no means uncommon in Yorkshire, and has occurred also in Scotland. (The scientific name is *Eupithecia indigata.*)

283. THE WILD THYME PUG.—The fore wings are rather short, and rather rounded at the tips; all the wings are slightly scalloped at the hind margin; the fore wings are gray, with a long black discoidal spot, and nine or ten zigzag or waved darker transverse lines, some of which are distinct on the costal margin, but vanish towards the centre of the disk, re-appearing on the inner margin, where ten may be counted without difficulty; the

hind wings are precisely the same colour as the fore wings, and have a slender crescentic discoidal spot, but no distinct transverse lines, except the slender interrupted marginal line, which is common to all four wings; the head, thorax, and body are gray, and scarcely at all spotted.

The CATERPILLAR is thus described by Mr. Crewe, under the name *Eupithecia distinctata*: "Rather long and slender, tapering considerably towards the head; the ground colour is dark green; the central dorsal line broad, and purplish red; the spiracular line indistinct greenish yellow; the skin is wrinkled, and the back studded with numerous very short stiff bristly hairs; down the centre of the belly is a whitish line; the ventral segmental divisions are yellowish." It feeds on the flowers of the wild thyme (*Thymus serpyllum*). The CHRYSALIS is yellowish green and olive, and changes on the ground in a slight earthen cocoon.

The MOTH appears on the wing in July and August. It has been taken in Scotland, and is common and generally distributed in Ireland. (The scientific name is *Eupithecia constrictata.*)

284. THE CAMPANULA PUG.—The fore wings are pale dingy brown, with a clearly defined, oblong, discoidal spot, and scarcely any other distinct markings; there are a few very indistinct dark marks between the costal and sub-costal rays, and a few dark dots here and there on the wing-rays, the wing-rays themselves being evidently darker towards the hind margin, and this dark portion being intersected by a slender white zigzag line, which in some specimens terminates in a small white spot at the anal angle of the wing; on the hind margin, just within the fringe, is a slender interrupted dark line; the fringe itself is dingy brown, interrupted by a few wedge-shaped white spots, very feebly marked; the hind wings are slightly paler, with a small discoidal spot, a few dark spots on the wing-rays, and a slender interrupted marginal line; the head, thorax, and body are of the same colour as the fore wings, and indistinctly dotted with darker brown.

Mr. Crewe thus describes the CATERPILLAR: "Rather short and stumpy; the ground colour light ochreous brown; the central dorsal line very deep brown or black, intersecting and uniting a chain of very strongly-defined black or deep brown lozenge-shaped spots, placed in the centre of each segment; sub-dorsal lines very slender and faint, blackish or deep brown; head, dingy brown or black; spiracular and central ventral lines, dingy black or brown; central dorsal spots becoming confluent, and merged in the central line on the anterior and posterior segments; both spots and ground colour varying considerably in intensity of colouring. The skin is rough and wrinkled, and sprinkled with a few whitish hairs. It feeds upon the unripe seeds and seed-capsules of the nettle-leaved campanula (*Campanula trachelium*). Until nearly full-grown it lives either in the dry corolla-tube, or just at the crown of the capsule. In confinement it will feed upon the garden species of campanula. It is full-fed at the end of August and beginning of September. The CHRYSALIS is enclosed in a slight earthen cocoon; its thorax and wing-cases are golden yellow; its body reddish; the abdominal divisions and tips are red."

The MOTH appears on the wing in July. The caterpillar has been found by Mr. Crewe, who says: "A few weeks since, whilst walking in a beech-wood near Tring, I found a number of caterpillars of some species of *Eupithecia* unknown to me, feeding on the seed-capsules of *Campanula trachelium.*" Mr. Crewe sent them to Dr. Breyer, who at once pronounced them to be the species described above. (The scientific name is *Eupithecia campanulata.*)

Obs.—Mr. Doubleday seems to have no doubt that this species is the *Denotata* of Hubner; but as this problem can scarcely be solved now, it seems desirable to continue Herrich-Schæffer's very appropriate name of *Campanulata*, as there can be no doubt as to the species intended by that eminent lepidopterist.

285. THE NARROW-WINGED PUG.—The fore wings are rather elongated, rather narrow, and

rather pointed at the apex; they are dark smoke-coloured, with a number of white markings, which are disposed in four irregular transverse bars; the first, second, and third of these are double, that is, are severally intersected by a delicate dark line; the first and third extend from the costal to the inner margin; the second ceases about the middle of the wing; the fourth, parallel with the hind margin, is single and strongly dentate; the discoidal spot is very small, nearly circular, quite black, and adjoins the second or abbreviated double bar; the hind wings are light gray, with three smoke-coloured transverse bars, the outer of which is marginal; the fringe of all the wings is dark smoke-coloured, spotted with pale gray; the head is gray, the thorax and body gray, with smoky markings.

The CATERPILLAR is thus described by Mr. Crewe: "Long and slender, tapering towards the head; the ground colour white or greenish white, with a chain of pear-shaped red dorsal spots, bordered on either side by an interrupted line of the same colour, and becoming confluent on the capital and anal segments; the sides are spotted with red; the belly has a central red line running the whole length; the body is clothed with a few very short hairs. A very pretty variety of this caterpillar has the ground colour bright green, with a series of tooth or pear-shaped white dorsal spots, intersected by a central horizontal dark green line, becoming purple at the anal tip; the spiracular line is white and broken; the back is sprinkled with a few short black hairs. It feeds on the flowers of the common ling (*Calluna vulgaris*) in August and September. The CHRYSALIS is enclosed in an earthen cocoon; its thorax and wing-cases are yellow; its body deeply suffused with red; and its thorax considerably elevated. The chrysalis of the green variety is suffused all over with green."

The MOTH appears on the wing in May, and has been taken in Suffolk and the north of England, Scotland, and Ireland; it is by no means uncommon. (The scientific name is *Eupithecia nanata*.)



286. The Plain Pug (*Eupithecia subnotata*).

286. THE PLAIN PUG.—The fore wings are very broad, and of an ochreous tint, with a small brown circular and inconspicuous discoidal spot; there are indications of four white bars, three of which are double, that is, intersected with delicate darker lines; the first is double, very short, and very indistinct; the second, double, and sharply angled in the middle, the angle pointing to the discoidal spot; the third is double, oblique, but more direct, and acutely dentate along the margin, near to the base of the wing; each tooth is tipped with black; the fourth bar is single and very decided; it is bordered by a bright ochreous band towards the base of the wing; the fringe is gray; the hind wings are ochreous gray, with whitish dentated transverse lines; the head, thorax, and body are pale ochreous.

Mr. Crewe thus describes the CATERPILLAR: "Ground colour dull yellowish green, pale green or reddish gray, with a chain of dull olive lozenge-shaped dorsal spots, becoming confluent towards the head and tail, and often bordered by an indistinct olive line; the spots and lines are sometimes very faint; the segmental divisions are yellowish or reddish; the spiracular line yellowish; the whole body very rough, and thickly studded with minute white tubercles and white spots, and sprinkled here and there with short stumpy hairs; the belly is pale green, with an interrupted line running the whole length. It feeds on the seeds and flowers of various species of *Atriplex* and *Chenopodium*, in August and September. It seems to prefer the banks of tidal rivers. I have taken it in profusion on the banks of the Orwell and the Stour, near Ipswich, but have also met with it in some plenty in waste ground near Bexley. It is not so easy to rear as others of the family, and often pines in confinement. The CHRYSALIS, which is enclosed in an earthen cocoon, has the wing-cases dark

green, and the thorax and body yellowish; the latter is not so tapering as many of the other *Eupitheciæ*."

The MOTH appears in June and July, and is not uncommon in the south of England. (The scientific name is *Eupithecia subnotata*.)

287. THE COMMON PUG.—The fore wings are rather long, rather pointed, and of a dull red brown, with an indistinct discoidal spot which is sometimes entirely black, sometimes entirely white, but more frequently black, with a white surrounding or a white margin; nearly parallel with the hind margin is a transverse series of white crescents, terminating in a white spot near the anal angle; there are six or eight dark transverse bars along the costal margin, but these scarcely reach the middle of the wing, or are very faintly indicated beyond; the wing-rays are dotted with black; there is a slender interrupted black line on the hind margin, and this is immediately followed by a pale marginal line of the fringe; then comes a dark line, then a second pale line, and lastly a dark line. The hind wings are plain brown, with scarcely any markings, except the usual slender interrupted dark marginal line. The head, thorax, and body are brown. The markings of the under side are more distinct than on the upper; the discoidal spot is much more strongly developed.

Mr. Crewe writes thus of the CATERPILLAR: "Common as this insect is everywhere, the caterpillar seems to be but little known. I have never myself beaten it, but have several times reared it from the egg; it so closely resembles that of *E. castigata* that it requires a very practised eye to distinguish them. It is slender, and tapers towards the head; its general colour is reddish-brown or dusky olive; along the centre of the back there is a chain of dirty greenish, lozenge-shaped spots, becoming confluent at the capital and anal segments; the spiracular line is waved yellowish, and occasionally interrupted with black; the segmental divisions are orange; the whole body is studded with minute white tubercles, and sparingly clothed with short whitish hairs. It feeds on white thorn (*Cratægus oxyacantha*), and is full-fed in the middle of July. The CHRYSALIS is enclosed in an earthen cocoon; it is slender and delicate; its head, thorax, and wing-cases olive. The body is reddish, and sharply pointed."

The MOTH appears on the wing in May and June, in England, Scotland, and Ireland. (The scientific name is *Eupithecia vulgata*.)



288. The Bleached Pug (*Eupithecia expallidata*).

288. THE BLEACHED PUG.—The fore wings are rather broad, rather rounded at the tip, and of a uniform testaceous gray colour, with a large and most distinct discoidal spot, which is all the more apparent from the extremely pale and bleached appearance of the area around it; there are six or eight dark transverse markings between the costal and sub-costal rays, and these seem to indicate the commencement of as many transverse lines, which, however, I fail to trace; there is a waved and interrupted white line, parallel with the hind margin; the hind wings are of the same colour as the fore wings, with scarcely any darker markings, except an indistinct discoidal spot; the head and thorax are pale; the body is pale, with a black back and black sides.

Mr. Crewe has described four varieties of the CATERPILLAR as under:—

"*Var.* 1.—Ground colour, pale canary yellow; central dorsal line, pale brown; down the centre of the back there is a chain of large, deep, rich brown, tooth-shaped spots, united at the points, and bordered on either side by an almost black sub-dorsal line; dorsal spots becoming faint and confluent in the central dorsal line, on the anterior and posterior segments, almost obliterated on the latter; below the sub-dorsal lines is a narrow rich brown line and a row of slanting stripes of the same colour; the spiracular line is yellowish; the belly is suffused on either side

with brown, and having a central line of the same colour running the whole length; the body is minutely studded with tubercles and very short hairs; it has a wrinkled appearance.

"*Var.* 2.—The ground colour is grass or yellowish green. The dorsal spots are brown, and perfectly lozenge-shaped, ceasing on the posterior segments; the sub-dorsal lines are deeper brown than the dorsal spots, and are interrupted at the segmental divisions; the spiracular line is yellowish, and bordered on the lower side with brown.

"*Var.* 3.—Ground colour various shades of green. All the markings, except the sub-dorsal lines, faint or altogether wanting.

"*Var.* 4.—Whole body, with the exception of the posterior dorsal segments, suffused with a deep rich chocolate brown; the posterior dorsal segments are canary-yellow, with a central pale brown line. On every other dorsal segment are two yellow spots; on each side are two yellow waved lines, enclosing a brown line. It feeds in September and throughout October on the flowers of the golden rod (*Solidago virgaurea*).

"In confinement it will eat various species of Michaelmas daisy. It has also, I believe, been beaten from the flowers of ragwort; but I have not myself met with it on anything but *Solidago virgaurea*. The CHRYSALIS, which is enclosed in an earthen cocoon, is large and thick, and has the thorax and abdomen yellow, the latter deeply suffused with blood red. The wing-cases are more or less tinged with green."

The MOTH appears in July and August, and has been taken in Wales and in the county Wicklow in Ireland, but I know of no recent captures. (The scientific name is *Eupithecia expallidata*.)

Obs.—M. Guenée seems to doubt whether it is distinct from the next species, but I confess I am unable to see any great similarity between them, and the discovery of the caterpillar so carefully characterised by Mr. Crewe seems to settle the question.

289. THE WORMWOOD PUG.—The fore wings are brown gray, the middle of the wing being suffused with a most delicate tinge of mother-of-pearl, which is due to the presence of numberless minute opalescent scales; between the costal and the sub-costal wing-rays are several transverse dark brown markings; the most conspicuous of these is situated beyond the discoidal spot (which is transverse and very conspicuous), and is bordered on the outside by a gray, almost white marking, of nearly the same size and shape; intervening between the other dark costal markings are less distinct pale gray markings; between the base of the wing and the discoidal spot is a transverse series of three double black spots, all of them on the wing-rays; beyond the discoidal spot is an oblique transverse series of compound spots, also on the wing-rays; each of them is gray in the middle and black on the outsides, and though the series of compound spots is transverse, each individual spot is longitudinal; between this series and the hind margin is a series of white spots, for the most part imperfect and obscure, but the one nearest the anal angle is always larger and more conspicuous than the others, and always double or nearly double; there is a pale line on the extreme hind margin, and another along the middle of the fringe; the hind wings are paler, and have a darker hind margin and discoidal spot, and a still darker marginal line; the head, thorax, and body are brown; the collar pale; the base of the body also pale, but immediately followed by a dark belt; there is a medio-dorsal series of minute crests on the body, all of which are tipped with white.

Mr. Crewe has written thus of the CATERPILLAR: "It would be impossible to give an accurate description of the almost endless varieties of this most variable caterpillar; they run so closely into each other that it would be an almost Herculean task to separate them. The ground colour is either deep rose colour, or dirty reddish-brown, with a series of reddish lozenge-shaped spots down the centre of the back, generally becoming faint or confluent towards the head or tail; in the green variety these spots are often entirely wanting; on each side is a number of narrow slanting

yellow stripes, forming a sort of border to the dorsal spots; spiracular line waved, yellow; body wrinkled, thickly studded with minute white tubercles, and somewhat more sparingly with short white hairs; segmental divisions yellow: it is thick and stumpy, tapering but little. It feeds from the end of August to the beginning of November on the flowers of the common yellow and hoary-leaved ragwort (*Senecio jacobœa* and *S. erucifolius*), on the hemp agrimony (*Eupatorium cannabinum*), the mugwort (*Artemisia vulgaris*), the yarrow (*Achillea millefolium*), the golden rod (*Solidago virgaurea*), and other plants. The CHRYSALIS, which is enclosed in a tightly-spun earthen cocoon, has the wing-cases bright green, the rays very prominent; the thorax yellowish green, and the body reddish yellow, with a dark green dorsal line."

The MOTH appears on the wing in June and July, and is common in most of the English counties, and occurs also in Scotland and Ireland.

290. THE LING PUG.—The fore wings are rather long, narrow, and pointed; they have a reddish brown tinge, with a distinct but not very large discoidal spot; between the costal and sub-costal rays are several transverse markings of a dark brown colour, and on the inner margin are other somewhat similar markings; these form, as it were, the two extremities of transverse lines, the presence of which is slightly indicated on the disk of the wing; parallel with the hind margin is an interrupted series of white spots, most of them linear and very obscure; but there is one more distinct and larger at the anal angle; the hind wings are pale dingy brown, with a whitish spot at the anal angle; the head, thorax, and body are of the same colour as the fore wings; the sides of the body are dark brown.

The CATERPILLAR is described by Mr. Crewe as "short, thick, and stumpy; the ground colour is dull pink or flesh-tint, with a series of dusky Y-shaped dorsal spots, connected by a central pink line, and becoming faint on the anterior, and almost obliterated on the posterior segments; each dorsal segment is studded with four yellowish tubercles; the spiracular line is yellowish, interrupted at intervals by dusky blotches. The head is dusky olive, marked with black; the belly is dusky or pinkish white; the back thickly studded with small white, and a few black, tubercles, and sprinkled here and there with short hairs. It feeds on the flowers of the common ling (*Calluna vulgaris*), in August and September. The CHRYSALIS is enclosed in an earthen cocoon; it is short and thick, with the thorax and wing-cases golden yellow; the body yellow, generally suffused with red; the wing-cases very transparent, and the tips of the body blood-red."

The MOTH appears on the wing in June, and has been taken at West Wickham, in Surrey, at Glasgow, in Scotland, and is common in Ireland. Mr. Crewe believes it to be common wherever its food-plant occurs. (The scientific name is *Eupithecia minutata*.)

Obs.—M. Guenée confesses himself unable to define any essential difference between *E. absynthiata* and *E. minutata;* he had united them in his "Species Général," until Mr. Doubleday, who has reared both species from the caterpillar, carefully keeping them separate, induced him to alter his opinion; in examining long series of both species obligingly sent to him by Mr. Doubleday, he finds the prevailing colour of *Absynthiata* more of an isabelline brown, and less liver-coloured than in *E. minutata;* the costal markings darker, the discoidal spot blacker, oblong and well-defined; the series of white markings near the hind margin is more or less interrupted, but is always continued to the anal angle, where it terminates in a large semi-double white spot. Of the present species, *E. minutata*, M. Guenée says it only differs from *E. absynthiata* in its smaller size, its more cinereous tint of colour, and its markings being more distinct. My own impression, with Mr. Doubleday's specimens before me, is that *E. minutata* is a less insect; the fore wings, measured from the costal margin to the anal angle, are decidedly narrower; relatively, but not actually, longer; and certainly more pointed; of the difference in colour, I am not

prepared to express an opinion, as varieties occur in the series of both insects in this respect.

291. The Currant Pug.—The fore wings are broad and rather short, they are rounded at the apex; their colour is dusky grayish brown, with scarcely a tinge of red or ferruginous brown; the discoidal spot is very black and distinct, and transversely elongate; between the costal and sub-costal rays are several transverse dark markings, and from these, obscure indications of waved transverse lines descend to the inner margin; parallel with the hind margin is an interrupted series of white markings, terminating in a double white spot, which is very conspicuous; the hind wings are scarcely paler than the fore wings, and have a decided discoidal spot, and several narrow transverse waved lines, and a white spot at the anal angle; the head, thorax, and body are of the same colour as the fore wings; the body has a medio-dorsal row of dark brown spots, and dark brown sides.

The caterpillar is described by Mr. Crewe as "slender, and tapering slightly towards the head, and about three-quarters of an inch in length. The ground colour is yellowish green; segments of rings yellow; the central dorsal line dark green; the two side ones of the same colour, but very indistinct; these latter are studded, in some instances, at intervals with black dots. The whole body is thickly sprinkled with small yellowish green tubercles, and very sparingly strewed with short whitish hairs. It strongly resembles a young larva of *E. cervinaria*. It turns pinkish when ready to spin up; the chrysalis is greenish brown, and enclosed in an earthen cocoon. The caterpillar feeds, towards the middle of October, on the under side of the leaves of the black currant; mine were taken in October, from the 13th to the 15th. I am inclined to think it is double-brooded. It eats oblong holes in the leaves, by which its presence may be generally detected. In repose it mostly lies along the mid-rib of the leaf.

"*Var.* 1.—Of a uniform pale green colour until the last moult; afterwards it has a chain of rusty brown dorsal spots running from tip to tail, and these are intersected and united by a central dorsal line; the ground colour is dirty yellowish green; the dorsal spots are confluent on the anterior and posterior segments, and bordered on each side by a dusky line; the sides are suffused with dusky reddish brown, and streaked with waved lines of the same colour; the belly is greenish; the body is covered with small white tubercles, and studded with a few short white hairs; the segmental divisions are orange; the head is greenish, marked with black; it feeds on the black currant and wild hops in September and October.

"*Var.* 2.—The ground colour is pinkish; the back and belly are tinged with green; the central dorsal line is dark green, having on each of the middle segments a black dot on either side; the segmental divisions are reddish; the body is thickly studded with minute white tubercles, and less thickly with short whitish hairs. Head green, transparent, marked with black. I found this caterpillar on the black currant in September, 1859; and this spring, as I expected, it produced *E. assimilata*."

The moth appears on the wing in May and August; its geographical range in this country has not been ascertained. (The scientific name is *Eupithecia assimilata*.)

Obs.—I am quite unable to write any character of this little moth, by which I can satisfactorily distinguish it from *Eupithecia absynthiata*, but I think Guenée is right in stating that the fore wings are generally broader and more rounded at the tip; the discoidal spot is very long and very dark, and is followed by five or six very delicate gray marks, which, however, are not entirely absent in *E. absynthiata*. The series of white spots near the hind margin is more clearly defined and distinct, and the double transverse white spot at the anal angle more conspicuous; the hind wings have a similar white spot at the anal angle; the fringe is slightly interrupted: in all other characters the moth resembles *E. absynthiata*.

292. The Slender Pug.—The fore wings

are short, broad, and rounded at the tip ; they are gray, with smoky-brown markings, which are numerous and conspicuous on the costal margin ; the discoidal spot is intensely black, but not very large; there are numerous closely approximate transverse markings between the costal and sub-costal wing-rays; the continuity of this series is broken at two-thirds of the distance between the base and tip, by two pale gray markings of similar shape ; the disk of the wing is traversed by narrow waved lines, most of which originate in the costal markings already noticed, but two differ from the rest in originating on the inner margin, and not reaching the costal margin, but uniting before they reach the sub-costal ray, from a loop which touches and encloses the discoidal spot ; there is a pale zigzag line parallel to the hind margin, and a slender interrupted black line on the margin itself : the hind wings are gray, with transverse markings : the head, thorax, and body are gray ; the last with the penultimate segment darker, especially on the sides.

The CATERPILLAR is thus described by Mr. Crewe :—

"Short and stumpy ; the ground colour is dirty yellowish green. The sides and centre of back slightly tinged with rose-colour, down the centre of the back is a row of very indistinct dusky spots, becoming confluent in a black line at the anal segment, and bordered by an interrupted black line. On each side is a row of slanting tubercular flesh-coloured stripes ; the head and fore feet are black ; it feeds on the catkins of sallow in spring, and is full-fed by the end of March and beginning of April. In appearance it much resembles the caterpillar of *Eupithecia isogrammata*. When full fed, it comes out of the sallow catkins, and spins a slight cocoon among earth, roots of grass, and moss. The CHRYSALIS is pale golden yellow ; the abdominal divisions dusky ; the thorax and wing-cases have a slight greenish tinge ; the eyes are prominent and blackish ; the body short and curtailed."

The MOTH appears on the wing in June, and has been found both in the north and west of England, and by Mr. Birchall at Killarney, in Ireland. (The scientific name is *Eupithecia tenuiata*.)



293. The Maple Pug (*Eupithecia subciliata*).

293. THE MAPLE PUG.—The antennæ of the male are very slightly pectinated, or rather ciliated, in this respect differing from all the other British species of the genus ; it is a very small species, the wings scarcely pointed, and the markings very indistinct; the fore wings are pale grayish brown ; there is an indistinct discoidal spot, and the other markings are transverse, waved and interrupted, and, with the exception of the slender interrupted black marginal line, none of them present characters to describe ; the area near the hind margin is the darkest, and is traverse ' by a pale zigzag line, which commences on the costal margin, and descends to the anal angle ; the hind wings are paler at the base than the fore wings, but otherwise of the same colour, and the markings, such as they are, are rather more distinct than on the fore wings.

The MOTH appears on the wing at the end of July, and was discovered by Mr. Doubleday, in Cambridgeshire, and subsequently by Dr. Knaggs, among maple trees, at Saltwood, near Hythe. (The scientific name is *Eupithecia subciliata*.)

Obs.—Mr. Doubleday says, he believes this insect to be the *Dosithea circuitaria* of Stainton's "Annual," but it bears no resemblance to the figures in Hubner's and Herrich-Schæffer's works. Mr. Stainton has an *Eupithecia subciliata* also (*Manual*, vol. ii. p. 90), but I am uncertain whether the present species is intended ; and the reference in the Index to *E. subumbrata* as a synonyme makes the matter still more obscure.

294. THE OAK-TREE PUG.—The fore wings are neither long and pointed, nor broad and rounded ; they are of a pale gray colour, with the slightest possible tint of olive green on

recent and very perfect specimens; there is a transverse discoidal spot, but so closely united with one of the transverse bands, that it is very inconspicuous; there are a number of transverse dark lines, and some of them, crowded between the discoidal spot and the base, communicate to the triangular basal area of the wing a darker tint, which in some specimens is very decided; beyond the discoidal spot, yet absolutely touching it, is a pale double bar; and again beyond this, a darker area, which encloses two pale waved lines; the inner of these has a tendency to be double, the outer is single and very zigzag; the hind wings are nearly of the same colour as the fore wings, and both have a slender interrupted black marginal line, the divisions of which are slightly crescentic, giving a somewhat scalloped appearance to the margin; all the markings are indistinct, and must not be regarded as fully described in this brief definition; the head and thorax are gray, the body olive brown, and a little variegated.

Mr. Crewe has described three varieties of the CATERPILLAR as under:—

"*Var.* 1.—Ground colour ochreous red; central dorsal line very dusky olive, almost black, interrupted. Down the centre of the back is a series of blackish or dusky olive arrow-shaped blotches, reduced in size on the posterior, and merged in the central line on the anterior segments; the sub-dorsal lines are slender, dusky, bordered with dull yellow; the spiracular line alternating between dull yellow and dusky olive. Between the sub-dorsal and spiracular lines is a row of slanting bright yellow stripes, interspersed with dusky blotches; the segmental divisions are orange red. The body is thickly studded with minute black tubercles, and thinly clothed with whitish hairs. In appearance it strongly resembles the larva of *Eupithecia virgaureata*.

"*Var.* 2. — The ground colour is pale yellowish green, the central dorsal line and blotches being similar to those of Var. 1, but much paler olive; the spiracular segmental divisions and lateral stripes are greenish yellow.

"*Var.* 3.—The ground colour is orange red. The back tinged and suffused with dull yellowish green; the dorsal blotches are wanting; the central dorsal line reddish brown or olive, enlarged in the centre of each median segment; the sub-dorsal lines are the same colour, and slender; the spiracular line and lateral stripes greenish yellow, the latter indistinct. It strongly resembles the larva of *Eupithecia abbreviata*."

These caterpillars under Mr. Crewe's care fed on oak, and he has been in the habit of beating them from the same tree for some years. In confinement many of them died when full-fed, a misfortune which he attributes to the difficulty of supplying them regularly with the youngest and most succulent leaves, which they always seemed to prefer; but I have been so accustomed to see full-grown caterpillars die, and hang like bags of water from their food-plant, that I think there must be some hitherto undiscovered cause for this mortality. The CHRYSALIS is either enclosed in a slight earthen cocoon, or secreted under bark of oak and white thorn; it is of a dark dusky red colour, the upper edges of the wing-cases being of a brighter red than the rest; it has a rough wrinkled appearance.

The MOTHS appear on the wing in May and June, and have been taken in several English counties. (The scientific name is *Eupithecia dodoneata*.)



295. The Brindled Pug (*Eupithecia abbreviata*).

295. THE BRINDLED PUG.—The fore wings are broad, and rather prolonged at the apex; their colour and ornamentation are happily described by the word "brindled," a peculiar coloration formerly seen on cows and some varieties of dog, but now extremely uncommon; the prevailing tint is ochreous brown; the discoidal spot is narrow, transverse, and very inconspicuous; the gray transverse bars as well as the dark brown ones are irregular,

waved, and interrupted; the principal gray bar is beyond the middle of the wing, and is very distinctly double, that is, intersected throughout by a delicate zigzag dark line; the wing-rays before entering this gray band are intensely black; there is a pale gray space near the base of the wing, and another smaller one immediately adjoining the discoidal spot; there is also a broken zigzag gray line parallel with the hind margin; on the hind margin itself is a slender black line, interrupted where intersected by the wing-rays; the fringe is pale gray at the base, spotted in the middle, smoky on the outside; the hind wings are paler, especially at the base, and are intersected by transverse series of black spots, which always occur on the wing-rays; the head is gray, the collar dark brown, the thorax ochreous brown, the body variegated, the dorsal surface is principally umber brown; there is an interrupted black line on each side, and the tip is pale gray.

The CATERPILLAR is thus described by Mr. Crewe: "Slender, hairy, tapering towards the head; the ground colour is pale yellowish red; the central dorsal line is pale olive; down the centre of the back is a series of pale olive V-shaped spots, sometimes bordered with yellow; the spiracular line is yellowish; the segmental divisions are red; the central ventral line is yellowish, and sometimes altogether wanting; the dorsal spots are frequently merged in a broad central line. The whole of the markings on this caterpillar vary much in intensity of colouring, but are usually faint and indistinct. It feeds on oak, and it is full-fed at the beginning of July. The CHRYSALIS is enclosed in a slight earthen cocoon; it is bright red; the thorax and wing-cases are paler than the body; the base of wing-cases is dusky; the abdominal divisions and tips are deep red."

The MOTH appears on the wing in March and April, and is of common occurrence in many of the English counties; it is also common in Ireland. (The scientific name is *Eupithecia abbreviata.*)



296. The Mottled Pug (*Eupithecia exiguata*).

296. THE MOTTLED PUG.—The fore wings are rather long and pointed; they are of a dingy grayish brown colour, with darker transverse lines; the discoidal spot is oblong and very black, and being unconnected with other dark markings, stands out conspicuously; there is a double pale transverse line between the discoidal spot and the hind margin; and a single pale line still nearer the margin; this, however, is very indistinct; the hind wings are pale, with a distinct oblique discoidal spot, and a few short transverse lines on the inner margin; the slender black marginal line is very distinct; the head, thorax, and body are brown and somewhat variegated.

Mr. Crewe says that the CATERPILLAR "somewhat resembles that of the little blue emerald (*Iodis lactearia*), and appears at the same time. It is long, slender, and tapering; the ground colour is dark green, with a central row of small dull red lozenge-shaped dorsal spots, connected by a central dorsal line of the same colour; the spiracular line is red, bordered with yellow; the segmental divisions yellowish; the dorsal blotches are often wanting on the anterior segments, and their place is supplied by a greenish line; in the centre of each dorsal blotch is a small yellow spot; it feeds in September and October on barberry, whitethorn, black currant, ash, alder, and sallow. The CHRYSALIS is enclosed in an earthen cocoon; it is long, slender, and tapering; its wing-cases are dark olive green; its thorax and body dusky olive; the abdominal divisions being gray and very conspicuous."

The MOTH appears on the wing in May and June, and is rather common in England and Ireland. (The scientific name is *Eupithecia exiguata.*)



297. The Juniper Pug (*Eupithecia sobrinata*).

297. THE JUNIPER PUG.—The fore wings are rather long and pointed; they are of a dull brown colour, with numerous darker lines; the discoidal spot is dark, but so united with an oblique band of the same colour that it is very inconspicuous; the wing-rays are conspicuously variegated with black, and between the sub-costal ray, which is almost entirely black, and the costal margin, are several transverse dark brown spots; there is the usual slender interrupted black line on the hind margin; the fringe is pale next the margin, then darker, then paler, and then again darker on the extreme outside; the hind wings are of the same brown tint as the fore wings, and are adorned with several series of black dots, none of which can be properly called lines, from the absence of continuity; the head, thorax, and body are brown; the latter has a darker belt near the base.

The EGGS are deposited in July, on the twigs of juniper; when first laid they are yellow, but shortly turn to a leaden blue; they do not hatch until the end of January, when the young caterpillars immediately begin feeding on the needles of the juniper.

Mr. Crewe says this CATERPILLAR "is rather variable in appearance; the ground colour is either dark green or yellowish red, with a series of rust-coloured dorsal blotches, intersected by a central dorsal dark green horizontal line, and bordered on either side by a yellowish one; these blotches generally disappear on the posterior segments, and are sometimes wanting altogether; the spiracular line is waved, and of a pale yellow or whitish colour; the belly has a whitish central horizontal line. It feeds only on the juniper. I have found it tolerably common on the old trees in gardens and shrubberies in Derbyshire. It is full-fed at the end of May and beginning of June. The CHRYSALIS is enclosed in an earthen cocoon or a slight web, among the stalks; its head, thorax, and wing-cases are dark green; its body yellowish."

The MOTH appears on the wing in July, and is by no means of uncommon occurrence in England, Scotland, or Ireland. (The scientific name is *Eupithecia sobrinata.*)



298. The Cloaked Pug (*Eupithecia togata*).

298. THE CLOAKED PUG.—This is the largest of our English species of *Eupithecia*, sometimes exceeding an inch in the expanse of its spread wings. The colour is pale brown, with a variety of waved transverse lines; two of the most conspicuous of these are dark brown, nearly black; the first commences at the costa of the fore wing, at about a third of the distance between its base and apex; it is very irregular, and has several teeth or projections directed outwards or towards the hind margin; the second also commences at the costa of the fore wing, and at about two-thirds of the distance between its base and apex; this also is very irregular, and has several teeth or projections directed inwards; this second line is continued through the centre of the hind wings; between these two lines on the fore wings, but much nearer to the first or inner one, is a conspicuous transversely oblong discoidal dark spot; there are seven inner marks of the same dark colour, arranged along the outer margin of the fore wings, and six along that of the hind wings; midway between the exterior transverse line and the marginal inner mark is a waved dentated band, extending through both wings, and this, in the living insect, has a beautiful pink tinge; this, however, fades after death; at the base of the fore wings is a short dark brown line, elbowed outwards.

Several specimens of the MOTH were taken by Mr. Stevens, Mr. Bond, and others, in June, 1845, at Black Park, in Buckinghamshire. (The scientific name is *Eupithecia togata.*)

Obs.—I first described this magnificent *Eupithecia* as British, in the "Zoologist" for 1845, at p. 1086, and have copied my original description here; but it appears to be an insect of excessive rarity.

299. The Double-Striped Pug.—The fore wings are very varied and distinctly marked, but all the markings are broken up, or interrupted, along the costa; they have a vinous tint in some specimens, almost rosy; there are three pairs of whitish transverse lines, and two single ones; the first single line is very short and near the base, the other single line is parallel with the hind margin, and zigzag; the three pairs are intermediate between these; the space between the second and third pair of pale transverse lines is grayish brown, with six, and sometimes seven, dark brown longitudinal wedge-shaped streaks, the bases of which rest on the third pair of transverse lines, and the apices point towards the base of the wing; the other interspaces are all of a vinous red colour; the hind wings are gray, with transverse zigzag markings, both paler and darker; the body is also variegated.

The caterpillar is thus described by Mr. Crewe: "Short and stumpy, tapering slightly towards the head; ground colour pale yellowish olive, reddish olive, or rusty red; central dorsal line dusky olive, almost black; down the centre of the back is a chain of dusky arrow-shaped spots, more or less distinct, and becoming merged in the dorsal line on the anterior and posterior segments; on each side is a broad ribbon-like stripe; yellowish in the middle, dusky at the edges; the dorsal spots are bordered uninterruptedly with yellow; the spiracular line is yellowish. The caterpillars from which the foregoing description was taken, were reared from eggs sent me by Mr. Hellins, at the end of May, and fed on flowers of *Anthriscus sylvestris*. They were full-fed at the end of June, and the first perfect insect appeared on the 16th of July. Mr. Hellins tells me he has reared the caterpillars on flowers of clematis. The chrysalis, which is enclosed in a slight earthen cocoon, has the thorax and wing-cases pale yellow; the body is short and yellow, with a red tip, and its divisions slightly so."

The moth appears in April and May, and again in July and August, flying about the furze bushes in the sunshine; it occurs commonly in most of our English counties, also in Scotland, and is common and generally distributed throughout Ireland. (The scientific name is *Eupithecia pumilata.*)



300. The V Pug (*Eupithecia coronata*).

300. The V Pug.—The fore wings are green, with numerous black and pale markings; of these the most conspicuous is a V-shaped black mark, the apex of which points towards the hind margin; one of the arms of this V, which, however, is rather irregular, touches the costa at about two-thirds of its length, the other vanishes in the middle of the wing; and between this V and the inner margin are four small black longitudinal streaks; the extreme hind margin has an interrupted black line just within the fringe; there are also three pairs of transverse zigzag silvery lines; the first pair near the base of the wing, the second just within the V mark, the third outside of the V mark; the hind wings are very pale towards the base, but clouded with smoke-colour towards the hind margin; the extreme hind margin, as in the fore wings, has an interrupted black line just within the fringe; the head, thorax, and body are greenish, and adorned with several black markings.

Mr. Crewe describes the caterpillar as under: "I think this caterpillar the prettiest of all the genus. It is excessively variable in colour—so much so, that it was not until I had repeatedly bred the insect that I could believe that such different-looking caterpillars could produce the same moth. The following are some of the principal varieties:—

"*Var.* 1.—Ground colour yellowish green, with three reddish dorsal lines; the centre

one interrupted, and sometimes enlarged into a chain of lozenge-shaped spots; the two side ones very indistinct; the body, when closely examined, is very slightly hairy.

"*Var.* 2.—Ground colour uniform sea-green. The dorsal lines and spots wholly or almost entirely wanting.

"*Var.* 3.—Ground colour greenish yellow, with a series of rusty lozenge-shaped dorsal spots or bars; the sides and belly are, more or less, suffused with rust-colour; the segmental divisions bright yellow.

"*Var.* 4.—Ground colour bright yellow, with a series of broad dull red dorsal bars, intersected and bordered by lines of the same colour; the sides and belly are thickly clouded with red. This caterpillar is somewhat different in gait and shape from those of all the other *Eupithecicæ*, and resembles that of *Hybernia rupicapraria*. Its favourite food is the petals of the traveller's joy (*Clematis vitalba*), from which plant it may be beaten in some plenty from the middle of July to the middle of August. I have also beaten it from the flowers of the hemp agrimony (*Eupatorium cannabinum*), the golden rod (*Solidago virgaurea*), and the wild angelica (*Angelica sylvestris*). The CHRYSALIS, which is enclosed in a rather closely-spun earthen cocoon, has the body very much curtailed, and sharply pointed; the eyes black and very prominent; the thorax and wing-cases spotted with black, the latter much ribbed; the spots do not appear for a week or two after the caterpillar has turned, and until then the chrysalis is of a uniform pale yellowish red colour."

The MOTH appears on the wing in April and May, and a second brood appears in August; it occurs in many of our English counties, and also in the counties Dublin and Wicklow, in Ireland. (The scientific name is *Eupithecia coronata*.)

301. THE GREEN PUG.—The fore wings are green, with a transverse elongate discoidal black spot, and numerous transverse waved black linear markings; there is usually a broad darker band across the middle of the wing, bordered on both sides by one of the black linear markings, and there is a pale, almost white, transverse waved line within, and parallel to, the hind margin; the hind wings are green, very distinctly marked with transverse black lines, one of which, crossing the middle of the wings, has a V-shaped angle pointed towards the hind margin; the head, thorax, and body are greenish; the body having a blackish belt near the base, and many other black markings.

Mr. Crewe describes the CATERPILLAR as under:—

"Short, thick, and stumpy; ground colour very pale yellowish green, darker when young; central dorsal line varying very much in breadth and intensity of colouring, sometimes rusty-red, sometimes dark green, frequently very indistinct, and sometimes wanting altogether; segmental divisions reddish; spiracular lines rather darker than the ground colour. Whole body very transparent; the circulation is very visible under the central dorsal line; the back is sprinkled with a few very short hairs; the dorsal stripe, when young, is broad, distinct, and rusty-red. It feeds, in April and May, on the blossoms of apple and wild crab, and is full-fed the middle of the latter month. I noticed that those which fed upon the wild crab were much brighter and darker coloured than those which fed upon the blossoms in the gardens. The CHRYSALIS is enclosed in a slight earthen cocoon; its thorax and wing-cases are yellow, suffused with olive; its body tapering; the lower divisions and tip blood-red. It remains in the chrysalis state about a fortnight."

The insect is excessively abundant in the apple and pear orchards in the south of France, as discovered and described by M. Guenée. It is well known to farmers and gardeners that out of every bunch of ten or a dozen blossoms, since two or three only expand their petals and drop them at the proper time, the others often retain their petals, even although fully developed, in an arched or globular form over the young fruit, and from being of a pure white colour in the case of pears, or a lively pink in that of apples, will become brown, and lose all their vitality. The caterpillar of the Green Pug

unites with a little beetle called the "apple weevil," which I have described elsewhere, in causing this singular appearance; the egg is laid on the flower-bud, and the young caterpillar emerging at the time that the flowers begin to prepare for expansion, enters the little chamber formed by the still united petals, and feeds in the interior of this choice domicile; begins by eating the still imperfect stamens, then devours the pistils, and, lastly, the fruit itself, hollowing it out and leaving only the rind, which forms a kind of cup; but before it has proceeded thus far, it has spun together the petals, and has fastened them to the calyx by threads so minute as to escape observation, although their presence is sufficiently obvious from the manner in which the petals, calyx, and what remains of the fruit, still adhere together. No sooner has the caterpillar attained its full size, than it spins a little cocoon within its dwelling-place, and therein changes to a chrysalis, and the purpose at first required by the continued adhesion of the fruit being fulfilled, it now falls to the ground, and in due time the moth emerges. Now the question arises, and it has been well put by M. Guenée, "Does this insect thus feeding on the future fruit, cause any real or important diminution of the crop?" I certainly think not. Nature produces flowers in such lavish abundance, that the trees would scarcely bear a tithe of the fruit if it all came to maturity; and every one must have observed, that when the green pug and apple weevil are altogether absent, the little pears will frequently fall to the ground by thousands and hundreds of thousands, simply because the tree cannot supply them with nutriment sufficient to bring them to perfection. But this subject has to be looked at from another point of view; nature, or rather a beneficent Providence, has provided for the preservation and continuance of every created being, and has appointed certain natural police to prevent each species from encroaching on the rights of its neighbours. The titmice and other small birds are the police appointed in the case of this little caterpillar; Providence wills that the little birds should check its too great increase; but our French neighbours have willed the destruction of these little birds; they suppose that they know best, and have slain, as far as they can, every feathered inhabitant of field or forest, garden or orchard. They are now profiting by experience, and are talking of laws which shall protect birds, because the birds protect the apples and pears; they begin to perceive that by destroying the one, they destroy the other also.

The MOTH appears on the wing in June, and is very common in England, Scotland, and Ireland. (The scientific name is *Eupithecia rectangulata.*)

Obs.—The moth is excessively variable, some being almost black in tint, others approaching to ochreous; I have described the more usual colour.

302. THE BILBERRY PUG.—The fore wings are gray, with a very slight, almost imperceptible tinge of green; they have a distinct, but inconspicuous discoidal spot, almost round, and numerous transverse smoky gray markings; the basal portion of the wing is pale; then follows a broad band of a rather darker colour, which includes the discoidal spot; and then a pale waved bar, separated from the broad band by a series of black dots; near the hind margin is a pale zigzag line: the hind wings are pale, with darker transverse markings, similar to those on the fore wings. This species, to my perception, always conveys the idea of having possessed brighter and more distinct colours, which have faded or been washed out.

Mr. Crewe describes the CATERPILLAR as under: "Rather short and stout, the ground colour dull yellowish green; the whole body is rather transparent, and more or less suffused with yellow; the central dorsal line is rather darker than the rest of the body; the subdorsal lines are wanting; the spiracular lines are dull yellow; the head, dusky brown or blackish; the belly is destitute of markings. It feeds on the leaves of the whortleberry (*Vaccinium myrtillus*), and is full-fed the beginning of May, when it spins a slight earthen cocoon." It has been observed by Dr. Breyer,

of Brussels, that it spins the leaves of the whortleberry together, and resides in the domicile thus formed, after the manner of so many of the *Tortrices*.

The MOTH appears on the wing in June, but is confined, as far as my information extends, to one English county, Devonshire, and to the neighbourhood of Killarney, in Ireland. (The scientific name is *Eupithecia debiliata*.)



303. The Dentated Pug (*Collix sparsata*).

303. THE DENTATED PUG.—The antennæ are slightly pubescent in the male, quite simple in the female; the fore wings are ample, slightly falcate, and pointed towards the tip, and they have a sinuous hind margin; their colour is dingy grayish-brown, with a distinct, discoidal spot, and a dark costal margin, forming almost a costal stripe, but having its inferior edge very irregular; this costal stripe is interrupted at two-thirds of its length by a double pale gray spot; beyond this pale gray marking is a transverse series of black spots or dots, all of them seated on wing-rays, and more especially on that particular ray nearest the inner margin; there is a pale, but in some specimens extremely indistinct, zigzag line, parallel to the hind margin, and this terminates in a gray spot near the anal angle; the hind wings have five of their seven parallel rays produced into angles on the hind margin; the exceptions are the fifth and seventh, counting from the anal angle; this structure gives a scalloped appearance to the margin of the wing; the tint is exactly the same as that of the fore wings, but there are a number of pale gray, as well as darker markings, above the anal angle, and extending considerably into the disk of the wing.

"The CATERPILLAR is pale green, with five white dorsal lines, and a broad yellow spiracular line (Treitschke); it feeds on *Lysimachia vulgaris*."—*Stainton's Manual*, vol. ii., p. 93.

The MOTH appears on the wing in June; my specimens came from the Cambridge collectors, but I am not sure of the exact locality; I have not heard of its occurrence in Scotland or Ireland. (The scientific name is *Collix sparsata*.)



304. The Small Seraphim (*Lobophora sexalisata*).

304. THE SMALL SERPHIM.—The antennæ are simple in both sexes; the fore wings are brownish-gray, with four paler transverse bars; the first of these is very short and very indistinct; it is situated near the base of the wing; the second bar is placed rather before, and the third rather beyond the middle of the wing; both of these are oblique, bent, and double, that is, intersected throughout by a slender waved ochreous line; the fourth is slender waved and single, and should, perhaps, be more properly called a line than a bar; the space between the two double bars is smoky-gray towards the costal, pale gray towards the inner margin, and just beyond the first double bar is the discoidal spot, distinct, oblong, black, and surrounded by a white margin; the space between the second double bar and the hind margin is smoky-gray: the hind wings are gray, with an indistinct darker bar across the middle, and a gradually darker hind margin.

The CATERPILLAR rests in a nearly straight position, generally stretched at full length on the mid-rib of the leaf of its food-plant, the head being tucked in and the mouth concealed between the first pair of legs. It does not fall from its food, or feign death, on being disturbed. The head is rather narrower than the body, and distinctly divided into two rounded lobes on the crown; the body is uniformly cylindrical, without excrescences, but a good deal wrinkled, and the thirteenth segment terminates in two divaricating points directed backwards. The colour of the head is opaque yellowish green; of the body, apple green, with three indistinct whitish stripes

down the back; the tips of the anal points are pink. It feeds on the common sallow (*Salix capræa*), and is full-fed about the middle of September, when it spins a slight oval cocoon among the fallen leaves. The CHRYSALIS is short, chesnut-brown, and shining; it remains in its cocoon throughout the winter.

The MOTH appears on the wing in May and June, and has been found in some of our English counties, both northern and southern, but I have not heard of its occurrence in Scotland; Mr. Birchall records it from Ireland on the authority of Dr. Bull, but no locality is given. (The scientific name is *Lobophora sexalisata.*)



305. The Seraphim (*Lobophora hexapterata*).

305. THE SERAPHIM.—The fore wings are long, broad, ample, and of a pale gray colour, with a slight tinge of ochreous in some specimens; they have a number of transverse smoky markings, some of which form linear series, while others are too irregular to describe; the extreme base of the wing is gray, then follows a short and narrow curved smoky bar, both margins of which are darker, then a pale elbowed bar, then a broader smoky bar, then a waved pale line, then an indistinct double smoky line, then a pale transverse space, which contains a small linear black discoidal spot; and beyond this the tints and markings are confused and broken, and mixed and interspersed with black arrow-heads placed transversely: the hind wings are small and rounded; in the male each of them has an oblong lobe at the base, extending nearly half the length of the wing, and delicately fringed at the margin, so as to have the appearance of a real wing; both the hind wings and their lobes are almost snowy-white, but the wings have a slender black line on the margin itself, and an obscure series of dots just within the margin.

"CATERPILLAR, beautiful green; a sulphur line on each side, and two sulphur points project from the anal segment; head with two yellow points (Treitschke). On sallow and aspen, June."—*Stainton's Manual*, ii. 94.

"Although this species is the commonest of the genus, its caterpillar is not very clearly known; Lyonet has given a very clumsy figure of it, and Treitschke a very brief description. The first-named of these authors does not mention its food-plant, the second at first makes it feed on beech, and afterwards on sallow and poplar."—*Guenée, Uran. et Phal.*, ii. 368.

The MOTH appears on the wing in June, and occurs in many of our English counties, but I do not recollect seeing it recorded from Scotland or Ireland. (The scientific name is *Lobophora hexapterata.*)

Obs.—I regret my inability to describe the caterpillar of this common moth, but shall be much gratified if the brief extracts given above afford a clue to its discovery.



306. The Yellow-barred Brindle (*Lobophora viretata*).

306. THE YELLOW-BARRED BRINDLE.—The fore wings are ample, but not elongate; they are of a delicate ochreous green colour, which is traversed by slender waved white lines, and decorated with transverse series of black spots; several of these combine in forming a broad band across the middle of the wing, but this, again, is interrupted by a pale median space, in which a slender linear discoidal spot may sometimes be traced; beyond the band is a double series of black spots, and on the hind margin is a single series of double black spots: the hind wings are very pale dingy brown, with the slightest possible trace of a discoidal spot and a transverse line below it.

The CATERPILLAR is full-fed at the end of June, when it rests in a somewhat arched posture, the anterior part of the body being held quite free of the food-plant, and bent outwards and upwards from the fourth segment, and the head slightly porrected; when touched, or otherwise annoyed, the head is tucked in a little, but the caterpillar will not readily fall from its food-plant, or relinquish the hold by its claspers; if compelled to relinquish this hold, it drops, hanging by a thread. Head not notched on the crown, decidedly narrower than the second segment, into which it is occasionally partially withdrawn; body almost cylindrical, but narrowest towards the anterior extremity; the second segment is narrower than the third, the third narrower than the fourth; the skin is folded transversely, but not conspicuously so; there are no humps or conspicuous warts on any part of the body, but the fourteenth segment terminates beneath the anal flap, in two very short approximate, obtusely conical points, directed backwards; each of these points emits a slender bristle, and there are several other small and inconspicuous bristles on various parts of the body. The colour of the head is purplish brown; the body beautifully variegated with purple-brown and apple-green; the brown is mostly dorsal, the green mostly ventral, but not entirely so; on the second and third segments, the brown is confined to an amorphous dorsal blotch; on the fourth segment, it descends to the insertion of the legs; on the fifth and sixth segments, it descends to the ventral surface, forming a complete band round the body; this band is, however, interrupted on the back by two transversely placed lunulate green marks; on the ninth segment, it appears on the dorsal surface only; on the tenth, it is confined to three parallel stripes on the dorsal, and a large patch on the ventral surface; on the eleventh, there is a medio-dorsal purple stripe, and a lateral amorphous purple patch; on the twelfth and thirteenth, the purple predominates almost exclusively; the legs are purple-brown; the ventral claspers green and very small; the anal claspers almost entirely purple. It is scarcely to be supposed that this distribution of colour obtains in every individual, but it was very constant in those I have had the opportunity of examining. It feeds on the privet (*Ligustrum vulgare*), and on the 1st of July, the caterpillars in my possession connected the leaves of the privet together by silken threads, and underwent pupation in the domicile thus formed.

The MOTH appears on the wing in May and June, and has been taken in several of our English counties, both northern and southern, but I do not recollect seeing it from Scotland. Mr. Birchall says it is common at Killarney, in Ireland. (The scientific name is *Lobophora viretata.*)



307. The Early Tooth-striped (*Lobophora Lobulata*)

307. THE EARLY TOOTH-STRIPED.—The fore wings are long and rather pointed, of a pale ochreous gray colour, with five transverse smoke-coloured markings; the first of these is single, very near the base, and elbowed outwards; the second is single and nearly direct; the third is double and waved; the fourth is double, waved and much interrupted; and the fifth, single and interrupted; these markings vary greatly in intensity, they are never very strongly developed, and often nearly imperceptible; there is a series of black dots on the hind margin; the discoidal spot is long, narrow, transverse, and inconspicuous; it is contiguous to the inner edge of the middle double marking or bar: the hind wings of the male have a small lobe at the base; they are gray, with two transverse series of obscure spots, and an interrupted marginal line. This species is sometimes of a beautiful light green when fresh from the chrysalis.

The EGG is laid in the spring, on the honeysuckle (*Lonicera periclymenum*), and perhaps also on the sallow (*Salix caprœa*), on which shrubs, as well as on other species of willow,

the CATERPILLAR feeds freely in confinement. When full-fed, which is towards the end of June, the caterpillar rests in a nearly straight position, the anterior extremity being slightly raised, and the middle of the back slightly arched. The head is prone, hidden from above by the anterior margin of the second segment; it is not perceptibly notched on the crown; the body is rather obese, rather depressed, and has a conspicuous dilated skinfold on each side, just below the spiracles, and two short points directed backwards, below the anal flap; the colour of the head is dull green, with intensely black ocelli; the body is dull, opaque green above, and has a narrow white stripe on each side, including the dilated skinfold; this white stripe extends from the head to the apex of the anal flap; the anal points are slightly tinged with pink; the belly has a broad median glaucous stripe, between which and the white lateral stripe the belly is nearly concolorous with the back; the legs are semi-transparent and pale green; the claspers are green, slightly tipped with pink. It spins a slight web on the surface of the ground, and, changing to a CHRYSALIS, remains in that state throughout the winter.

The MOTH appears on the wing in April, and occurs in England as well as Scotland, but is not recorded from Ireland. (The scientific name is *Lobophora lobulata*.)



308. The Barred Tooth-striped (*Lobophora polycommata*).

308. THE BARRED TOOTH-STRIPED.—The antennæ are almost simple in the male, quite so in the female; the fore wings are long and rather narrow; their colour is pale wainscot-brown, with various umber-brown markings; the principal of these are, first, a brown spot at the extreme base of the wing; then a short transverse angled line; then a broad and well-marked band of a very rich brown; this band is interrupted at the costal extremity by a large wainscot-brown blotch, contiguous to the outer border of which is the discoidal spot, not very apparent; at its lower extremity this band is interrupted by a small wainscot-brown blotch; beyond the band is a double waved bar, interrupted in several parts, but more particular near its costal extremity, by a pale space; and this is immediately followed by a double darker blotch, which has two acute angles, pointing towards the hind margin; there is a narrower band of brown contiguous to the hind margin; and on the margin itself is a series of minute black spots, arranged in pairs; the hind wings are pale, with a discoidal spot, a beautifully scalloped transverse line below the middle, and a dark interrupted line on the hind margin.

The EGG is laid in April or May, on honeysuckle or ash, on both of which the CATERPILLAR feeds in confinement; it is full-fed about the middle of June, and then rests in a nearly straight position, the head is prone, indeed, bent completely under, and the mouth closely pressed against the legs, which are crowded together, and directed forwards as if purposely to meet the head. Head decidedly smaller and narrower than either of the following segments; second segment slightly dilated at its anterior margin, thus forming a kind of shallow cup, into which the head is partially received; body obese, of uniform substance, and cylindrical with the exception of a dilated lateral skinfold; its surface both above and below most delicately shagreened; the thirteenth segment terminating in two pointed processes directed backwards. The colour of the head is dull but pale green; the dorsal surface of the body is dull green, with a narrow, medio-dorsal stripe slightly darker; this is sometimes so faint as to escape observation; indeed, it may possibly arise at all times from the presence of food in the alimentary canal; ventral surface with a broad median stripe of glaucous green, having within it a narrow medio-ventral stripe of a still paler and almost white green; but this, like the medio-dorsal stripe, is very obscurely

defined; the dilated skinfold, exactly intermediate between the dorsal and ventral surface, is whitish yellow, and forms a conspicuous lateral stripe continued from the head to the extremity of the anal flap; the series of spiracles is just above the lateral stripe, and of the same pale colour.

The MOTH appears on the wing in April, and has been taken in the southern and northern counties of England, more particularly about Windermere. (The scientific name is *Lobophora polycommata.*)

Obs.—The caterpillar of this moth is so like that of the *Lobophora lobulata*, that it is difficult to express the difference in words, but through the unceasing kindness of Mr. Doubleday, I have been enabled to place side by side specimens of both species reared from the egg, and a careful comparison shows that the caterpillar of *L. polycommata* is the more robust of the two. It changes to a chrysalis just below the surface of the earth, and remains in that state throughout the winter.



369. The Juniper Carpet (*Thera juniperata*).

309. THE JUNIPER CARPET.—The fore wings are rather narrow and rather pointed; they are of a delicate grey colour, with a basal blotch and a median band rather darker; the basal blotch has a blackish exterior margin; the median band is broad at the costal, narrow at the inner margin; it is bounded on both sides by a black margin, which is the more conspicuous from the paler ground colour with which it comes in contact; this black margin is irregular, and so indented that it frequently divides the band into four compartments, of which the costal compartment is much the largest, and contains the discoidal spot; the second is small and pear-shaped; the third and fourth are somewhat heart-shaped, with a very deep median notch, sometimes so deep as to divide the compartment into two; the appearance of this band reminds one of the Cheese-ring, the compartments being piled on each other like the stones of that celebrated object of curiosity; between the tip of the wing and the principal projection of the band is an oblique dark streak, and there is a series of double black spots on the hind margin, just within the fringe: the hind wings are pale gray, with the slightest possible indication of two darker transverse bars.

The CATERPILLAR rests with the head slightly bent under, the mouth meeting the legs; the head is of about the same width as the second segment, the body stout and uniformly cylindrical, except in having a lateral skinfold; the thirteenth segment terminates in two distinct points directed backwards. The colour of the head is green; of the body, also green, inclining to glaucous on the dorsal, to apple-green on the ventral area; on each side is a broadish stripe of a lemon-yellow, and below this, in the region of the spiracles, is a double stripe, the upper portion being purple-brown, the lower portion white; the spiracles are yellow, the legs reddish-brown, the claspers green. It feeds throughout the late summer and autumn on the common juniper, and is sometimes very abundant where that shrub occurs. The CHRYSALIS is green, and is either suspended among the twigs of the juniper, or changes on the surface of the ground; the caterpillar spins a slight web.

The MOTH appears on the wing in October, and is very abundant on the downs about Croydon and Mickleham, in Surrey; it is to be obtained by searching the stems of the juniper bushes with a lantern. Mr. Stainton also reports it "near Glasgow," but I have not seen specimens either from Scotland or Ireland. (The scientific name is *Thera juniperata.*)



310. The Chestnut-coloured Carpet (*Thera simulata*).

310. THE CHESNUT-COLOURED CARPET.—The fore wings are rich umber-brown, with a basa

blotch and a median band rather darker; both these markings are bounded by very dark margins, and come in contact with a bleached portion of the ground colour, so conspicuous as sometimes to appear absolutely white; the band contains the discoidal spot; in many specimens there is a zigzag white line between the median band and hind margin: the hind wings are smoky-gray.

The Rev. Joseph Greene thus describes the CATERPILLAR: "When full-grown it is short and stumpy, extremely like the caterpillars of some of the pugs. The head is pale brown, the ground colour of the body grass-green. Dorsal line broad, pure bluish white; this is bordered on each side by a slender stripe of the same colour; spiracular line the same. These stripes are all very clear, and well defined. Segmental divisions yellow, claspers pink. There are no dots or marks. It is one of the most sluggish creatures I ever saw, lying for hours—even days—in the same place, just stretching itself to get at the food within reach. It remained a long time in the larval state, as it was hatched the third week in March, and did not spin up till June 6th. It effected this change between moss and the sprig of Juniper, on which it was feeding, so unwilling was it even then to move. The CHRYSALIS is dark grass-green; abdominal segments lighter.

The Chesnut-coloured Carpet is double-brooded; the MOTH appears on the wing in April and May, and again in August, and has been taken near Newcastle, Keswick, Darlington, and Glasgow; and Mr. Birchall reports it to be common in Ireland. (The scientific name is *Thera simulata.*)



311. The Shaded Broad Bar (*Thera obeliscata*).

311. THE SHADED BROAD BAR.—The fore wings are brownish-gray, with a basal blotch and median band darker, and yet brighter, having a decided tinge of chesnut; these markings are not bounded by dark margins, but have several dark wing-rays and a dark inner margin; there is a smoke-coloured tinge towards the hind margin: the hind wings are pale brownish-gray, with a slight indication of a discoidal spot, and a smoky tinge on the hind margin.

The CATERPILLAR rests in a nearly straight position, lying along one of the needles of the Scotch fir (*Pinus sylvestris*), on which it feeds, its claspers being always attached, but its legs free; it will not roll the anterior part of the body into a volute, nor will it fall from its food-plant on being annoyed; the head is exserted, and of slightly less circumference than the body, and has scarcely any indication of a notch on the crown; its position is prone, the mouth being tucked under and brought into close proximity with the legs; the body is of uniform thickness throughout, and has a lateral skinfold; it is otherwise uniformly cylindrical and quite smooth; the thirteenth segment terminates beneath the anal flap in two short points directed backwards. The colour of the head is pale opaque green, of the body dull green, with three white dorsal stripes, each of which is somewhat double, that is, it has a narrow darker median stripe vaguely defined; of the three double stripes, the middle one is less distinct and less conspicuous than the others; on the lower or ventral margin of the lateral skinfold is a narrow but clearly defined white stripe, and there is also a narrow but clearly defined medio-ventral white stripe; the legs and mouth are pink, the claspers green.

The MOTH appears on the wing during the summer months, and is common in many English counties, but is not reported from Ireland. (The scientific name is *Thera obeliscata:* it is considered by most of the recent continental authors to be a variety of *Thera variata* of the Vienna Catalogue; but as the true *Thera variata* has never occurred in England, the two are probably distinct species.)



312. The Pine Carpet (*Thera firmata*).

312. The Pine Carpet.—The antennæ of the male are strongly pectinated; the fore wings are chesnut-gray, very pale. There is a basal blotch and a median band of a rather brighter chesnut, but these are scarcely distinguishable from the general ground colour of the wing, and they have neither dark margins nor rays, but the inner margin of the wing is slightly bordered with dark smoky-brown; the hind wings are pale wainscot-brown, without markings.

The caterpillar rests in a nearly straight position on the needles of the fir, but with the head slightly bent under, so that the mouth is closely approximate to the legs, but does not assume the involute form. The head is distinctly exserted, and yet slightly narrower than the second segment; there is scarcely any indication of a notch on the crown; the body is uniformly cylindrical, with the exception of a lateral skinfold, and is quite smooth; the thirteenth segment terminates beneath the anal flap, in two points directed backwards. The colour of the head is ferruginous red, with a darker line on each cheek near the crown; the dorsal area of the body is dull grass-green, with a slightly darker mediodorsal stripe; on each side is a slender stripe of a dingy white, and below the spiracles is another slender line, also whitish, but becoming yellow from the ninth to the terminal segment; the ventral area is brighter green, with three pale slender stripes which extend from the third pair of legs to the ventral claspers; these are tinged with brown, and have a reddish line on the outside. It feeds on the common fir.

The moth appears on the wing in July, and occurs not uncommonly in England and Scotland, but is not reported from Ireland. (The scientific name is *Thera firmata*.)



313. The Ruddy Highflyer (*Ypsipetes ruberata*).

313. The Ruddy Highflyer.—The palpi are porrected in front of the head and very long; the antennæ are simple in both sexes; the fore wings are gray, confused and marbled with numerous transverse markings; at the base of the wing there is usually a triangular space, rather pale; this is followed by a broad darker band which contains a median bar still darker, and on each side of this, but separated by a bar of the usual gray ground colour, is an interrupted waved ferruginous bar, rather indistinct; then follows a pale gray bar, which includes the discoidal spot, which is long, narrow, and black; and again beyond this pale gray bar are two interrupted waved ferruginous bars, separated by a gray bar. There is an oblique black mark at the apical angle of the wing, and many markings not described; but all the markings are so obscure and ill-defined that it is difficult to find words which will render them intelligible. The hind wings are pale brownish gray, with a faint discoidal spot and two faint transverse bars.

The caterpillar is described by Mr. Machin as rather hairy, and of a dirty-white or grayish colour. Mr. Doubleday informs me that it changes to a shining black chrysalis in the autumn, and remains in that state through the winter.

The moth appears in May, and has a wide range in England, having been taken at Cambridge in the east, Barnstable in the west, and Birkenhead in the north; but I have no account of its occurrence in Scotland or

Ireland. (The scientific name is *Ypsipetes ruberata.*)



314. The May Highflyer (*Ypsipetes impluviata*).

314. The May Highflyer.—The palpi are moderately long; the antennæ are simple in both sexes; the fore wings are grayish green, with a broad median band of pale gray; this band contains the discoidal spot, which is long, very narrow, black, and rather indistinct; the basal portion of the wing is of three different tints, all of them bordered by zigzag black lines, and on the apical portion of the wing, that is between the median band and the hind margin, there are also different tints transversely arranged, and each tint is bordered by zigzag lines. The hind wings are pale brownish gray, with a faint discoidal spot and two faint transverse bars.

The caterpillar is stout and obese; it conceals itself during the day in a rolled-up leaf of the alder, on which it feeds exclusively by night. Its colour is dingy yellow, with a medio-dorsal and two lateral lines of a glaucous green.

The moth appears on the wing in May, and, according to Guenée, also in July and August. It is by no means common, but has been taken in many of the English counties, in Scotland, and in Ireland. (The scientific name is *Ypsipetes impluviata.*)



Varieties of the July Highflyer.



315. The July Highflyer (*Ypsipetes elutata*).

315. The July Highflyer.—The antennæ are simple in both sexes, and the palpi moderately long. The fore wings are dull olive-green, with a small basal smoke-coloured blotch, and five transverse smoke-coloured bars, of which the second is very much bent, the third and fourth broken off in the middle; there is no discoidal spot, but near the hind margin, and exactly half-way between the costal margin and the anal angle, is a nearly circular pale gray or whitish blotch; the hind wings are pale brownish gray, with a faint discoidal spot and two extremely obscure transverse bars.

The eggs are laid in July, on several species of sallow, *Salix caprœa* and *S. cinerea* being preferred. The young caterpillars emerge in twelve days, and feed on the sallow leaves until half-grown, when they hybernate. In the spring they begin to feed again, as soon as the leaf-buds of the sallow expand. They then grow very rapidly, and are frequently full-fed by the 1st of June. The full-fed caterpillar has a singular habit of secreting itself in the seed-down of the sallow during the day, and of spinning this together in masses; it seems to feed principally during the night. When full-fed it is an obese and lethargic caterpillar, which doubles itself up, and falls from its food-plant if shaken or annoyed. The head is narrower than the body,

scarcely notched on the crown; it is porrected in crawling; the body is rather depressed, and slightly attenuated anteriorly. The colour of the head is clear brown, rather glabrous, the cheeks are reticulated with black, the lip is entirely black; the dorsal surface of the second segment brown and shining, that of the following segments pale brown or smoky-black, of a very varied tint in different individuals, but in each individual the tint of the dorsal area is pretty uniform as far as the spiracles; it is, however, intersected throughout by two distinct pairs of white stripes, the inner stripe of each pair being the broader and more distinct; both are irregular and interrupted, and just below the spiracles is a third white stripe, still more obscure and interrupted. This third stripe serves as a boundary between the dorsal and ventral area. The ventral area, anal flap, and claspers are testaceous brown; the legs testaceous brown, spotted with black. These caterpillars construct themselves cells in the down of the sallow seed, and therein change to bright brown and very glabrous CHRYSALIDS in the beginning of June. The caudal extremity of the chrysalis terminates in two setiform processes, which are approximate at the base, but divergent at the tip.

This extremely variable MOTH appears in July, and occurs in almost every English county, and also in Scotland. Mr. Birchall reports it as common and generally distributed in Ireland. (The scientific name is *Ypsipetes elutata.*)

Obs.—In the genus *Ypsipetes* the species have a decided resemblance to each other, both in the economy of the caterpillars, and in the size and general colour of the moths. They are liable to infinite variation, but the variations are too numerous to describe, and too confused to be expressed by representations, except in the third or common species *Y. elutata.* It will be seen that I have figured five specimens of this insect, selecting such as I considered particularly interesting. As a general observation, *Y. ruberata* may be distinguished by its longer palpi, and its ferruginous bars, which, however indistinct, seem to be always present; *Y. impluviata* by its median gray bar containing the discoidal spot; and *Y. elutata* by its decided green tint, and the round whitish spot near the hind margin. With these exceptions, no markings possess any decided constancy.



316. The Blue-bordered Carpet (*Melanthia rubiginata*).

316. THE BLUE-BORDERED CARPET.—The palpi are rather short, the antennæ of the male slightly fringed, of the female simple. The fore wings are white, with a dark and almost triangular blotch at the base, and another large one on the costal margin; both of these are smoky-black, and the latter includes the discoidal spot, which is intensely black; between this costal blotch and the inner margin is a series of small blotches, which are rarely similar in two specimens; sometimes they are entirely wanting, and sometimes they are united so as to form with the costal blotch a continuous band across the middle of the wing. Between these extremes every conceivable variation occurs. There are two smoky-blue bars parallel with the hind margin: the hind wings are white, excepting a faint discoidal spot, and two smoky blue bars parallel to the hind margin, and similar to those on the fore wings; the head and thorax are smoky-brown, with some small white markings; the body is white.

The CATERPILLAR is full-grown about the beginning of June, and then rests with the claspers tightly attached to a twig of the food-plant, and all the body anterior to the ventral pair porrected in a straight line, at an angle of 45 degrees. When annoyed, the anterior part of the body is waved backwards and forwards in the air. The head is prone, and about equal in width to the second segment. The body is long, slender, and smooth, entirely without humps; the thirteenth segment terminates beneath the anal flap, in two rather long parallel points, directed backwards.

The colour of the head and body is apple-green, the latter with a rather broad medio-dorsal stripe, considerably darker than the ground colour; on each side is a yellowish or whitish green stripe, but all the colours must be characterized as green. It feeds on blackthorn and bullace, and occasionally in gardens on the cultivated damson. It spins a very loose and shapeless web, and therein changes to a smooth brown CHRYSALIS.

The MOTH appears in July in most of our English counties, in several Scotch localities, and in the counties Dublin and Wicklow in Ireland. (The scientific name is *Melanthia rubiginata*).

Obs.—I possess specimens in which the smoky-blue colour of the hind margin is more



Melanthia rubiginata, var. *Plumbata*.

or less spread over the wing, and one in which the wings are entirely of this colour. This is represented in the second figure, and is the variety *Plumbata* of Mr. Doubleday's list.



317. The Purple Bar (*Melanthia ocellata*).

317. THE PURPLE-BAR. — The palpi are rather long and porrected in the similitude of a beak; the fore wings are creamy-white, with a triangular blotch at the base, and a broad median band, both of a rich dark brown glossed with purple; the band has a rather sharp angle on its outer margin, and is considerably indented on its inner margin; it includes the discoidal spot, which is very large and of unusual form, somewhat like an arrow-head or a fleur-de-lis, and pointing towards the hind margin; between the basal blotch and median band are a few smoke-coloured markings, and there are some similar ones between the median band and the tip of the wing; the hind margin is clouded with similar brown, and there is a slender very dark line on the hind margin, which is continued also on the hind wings; these are white with a discoidal spot; the head, thorax, and base of the body are black; the remainder of the body creamy-white, with two nearly square black spots placed transversely on each segment.

The EGGS are laid on lady's bedstraw (*Galium verum*) in June, and the CATERPILLAR is full-fed by the middle of July, when it rests in a somewhat bent position on its food-plant; the head is pointed, the back slightly arched, and the legs directed forwards; on being annoyed, the head is altered into a prone position, and bent under, the back increasingly arched, and the caterpillar falls to the ground as though lifeless, and frequently remains as much as an hour perfectly motionless; the head is about the same width as the second segment, perhaps rather narrower, and there is no apparent notch on the crown; the body is almost uniformly cylindrical, but slightly increases in size towards the anal extremity; it is wrinkled transversely, and has numerous small warts, each of which is surmounted by a bristle. The colour of the head and body is yellowish-brown, with a slight tinge of olive-green; the head has three parallel longitudinal stripes almost white, and the spaces between these are dotted with darker brown; the body has numerous and very distinct white markings; there is a pair of white and closely approximate medio-dorsal stripes on the second, third, and fourth segments; and the slender darker stripe which separates them is continued to the anal extremity, passing through the points of five very distinct white V-shaped markings, whose points are directed backwards; these V's are bordered by a darker ground colour, which renders them very conspicuous; the dorsal area is bordered by a very distinct white stripe, which, commencing at the mouth, extends to the extremity of the anal claspers, emits a branch into the ventral claspers, and touches,

but does not include, the jet black spiracles; the ventral is paler than the dorsal area, but is thickly sprinkled with yellow-brown dots, some of which form a narrow medio-ventral stripe, while others form oblique lines, one on each segment. About the 20th, or from that to the end of July, these caterpillars spin together the little stems of the bedstraw close to the ground, and, forming the slightest covering, they change to brown and shining CHRYSALIDS.

The MOTH appears in June, in England, Scotland, and Ireland. (The scientific name is *Melanthia ocellata.*)



318. The Beautiful Carpet (*Melanthia albicillata*).

318. THE BEAUTIFUL CARPET.—The fore wings are creamy-white, with a large brown blotch at the base, and a triangular brown blotch on the costal margin, near the tip of the wing; from the lower extremity of the blotch, two delicate waved lines extend side by side to the inner margin, both of them clearly defined, but the inner is much the more distinct of the two; beyond these is a series of somewhat semicircular smoke-coloured markings, and the hind margin and fringe are also smoke-coloured; the hind wings are creamy-white, with a broad smoke-coloured hind margin, and two delicate lines occupying a similar position to those on the fore wings; the discoidal spot is faintly indicated on all four wings; the head, thorax, and base of the body are dark brown; the rest of the body is mottled with various shades of brown.

Writing the life-history of this species, Mr. Beauchamp says: "Some eggs sent me from the North hatched about the end of June, and some that I procured in Sussex hatched about a week later. I had no bramble or raspberry at hand, so I tried them with several other plants, of which they took readily to wild strawberry. I soon, however, transferred them to bramble, on which they fed up very fast, being full-grown by the end of July. I should describe them thus: Velvety deep green, with a few short and rather bristly hairs; head greenish brown, with three pale vertical stripes; the interstices of the segments yellowish, especially on the sides; on the back, at the posterior part of each of the segments from the fourth to the tenth inclusive, there is a triangular rather bright yellowish brown spot (looking red by contrast with the green ground colour), the apex towards the head bordered with dark brown, and having a dark brown tapering streak up the centre; the surface of these spots appears corrugated. Claspers and posterior part of anal segment brown, spiracular line whitish, edged beneath on the first four and on the tenth and eleventh segments with brown; the belly is green, with numerous whitish lines and dots. The usual position of the larva is that of a bow, but it has a trick, especially when changing its skin, of hanging down with the body bent backwards almost at a right angle behind the fourth, and again behind the ninth segment, so as to resemble the outline of a very lanky letter E. The back is round, and the belly very flat; the body tapers rapidly from the fifth segment to the head."

The MOTH makes its appearance in June, it has been taken in many English counties, and in the Irish counties Wicklow, Kerry, and Galway, but I do not recollect having seen Scotch specimens. (The scientific name is *Melanthia albicillata.*)

Obs.—Mr. Beauchamp adds the following note respecting this species: "Its vivid colour and velvety texture render this a very beautiful larva; but the perfect insect, when bred, seems to me almost without a rival for purity and exquisite delicacy of design. I should doubt whether, in the range of natural objects, a more beautiful line is to be found than that exquisite cool gray streak upon the rich creamy ground of the fore wing."



319. The Argent and Sable (*Melanippe hastata*).

319. THE ARGENT AND SABLE.—All the wings are white, with a broad black marginal band, and each wing having a distinct white arrow-head running into this marginal band about the middle; the black is also interrupted by a short zigzag white line near the tip of the fore wing, and a white spot at the anal angle of each wing; there are also numerous black markings at the base of the fore wings, a black spot, sometimes double, on the middle of the costal margin, several black spots about the middle of the inner margin, and others again, in the centre of the wing; there are a few black markings at the base, and on the inner margin of the hind wings; the fringe of all the wings is alternately black and white; the antennæ are black, with white rings; the thorax is black, with four transverse white lines; the body is gray, with two black spots, and a white margin to each segment.

The head of the CATERPILLAR is of moderate size; the body, when at rest, almost straight; the head not tucked in, and hence the anterior part of the body not involute; the second segment is covered with a shining plate; the other segments regularly and transversely wrinkled, and of a texture like leather; the tenth segment is rather the largest, and from that the larva tapers slightly to both extremities. The colour of the head is black and shining; the body is generally black, but sometimes rich black-brown; on each side is a continuous series of minute black dots, which form a slender lateral stripe along all the segments except the second and thirteenth; this stripe is above the spiracles; the spiracles are black, and each is enclosed in a white spot, and below each white spot is a crescentic white marking, the convexity of which is towards the belly, the cusps towards the back; above the slender lateral stripe already described there is sometimes an interrupted sub-dorsal stripe; all these markings vary occasionally from white to brick-dust red. It feeds on birch (*Betula alba*) and sweet gale (*Myrica gale*). The economy, habit, structure, and distribution of colour in the caterpillar of *Melanippe hastata* are entirely different from those of any other of the genus *Melanippe*. It spins together the leaves of its food-plant, and feeds from the inside of the chamber thus formed, sometimes eating through the substance of the leaf, at others eating only the upper surface; it is full-fed towards the end of August, and soon afterwards becomes a CHRYSALIS, in which state it passes the winter.

The MOTH appears on the wing in June, and appears to be generally distributed, occurring in both northern and southern English counties, in Scotland, and in Ireland, in which island Mr. Birchall says it is common at Killarney. (The scientific name is *Melanippe hastata*.)

Obs. 1.—A variety of great beauty and distinctness occurs in the north of England and in Scotland, in which the black greatly predominates, and the white is consequently



Variety of *Melanippe hastata*.

less; it nearly agrees with the *Melanippe, hastulata* of Guenée, but Mr. Doubleday informs me it is not that insect.

Obs. 2.—I have to acknowledge my great obligation to the Rev. John Hellins, for the free use of his valuable notes in describing the caterpillars of the genus *Melanippe*, and also of a most beautiful series of exquisitely coloured drawings of each species, by Mr. Buckler.



320. The Small Argent and Sable (*Melanippe tristata*).

320. THE SMALL ARGENT AND SABLE.—The

fore wings are smoky-black, with two white bars; the first of these, situated near the base, is short and rather narrow; the second is beyond the middle, angled and interrupted by a median series of black dots; the black area between these bands is slightly marbled with gray, and includes an intensely black and rather large discoidal spot; the broad dark area on the hind margin is tinged with brown, and marbled with gray: the hind wings are smoky-black, with a broad median white bar, interrupted as in the fore wings with a series of black dots; the dark basal area includes two transverse white lines, and the marginal area, a median white arrow-head; the fringe is alternately black and white; the head, thorax, and body are smoky-gray; the body has a white margin, and two black spots placed transversely on each segment.

The CATERPILLAR is cylindrical, slightly attenuated in front, and rests in nearly a straight posture, but when disturbed, tucks in its head, and the anterior part of the body is then slightly involute. The head is brown, dotted with black; the body brown, with a dark, nearly black, narrow median stripe; on each side of this are two white dots on each segment; and on each side of the body are two narrow, pale, slightly undulating stripes, the lower of which is immediately above the spiracles; these two stripes are most delicately margined with black. This caterpillar is extremely constant in colour; it feeds on the hedge bedstraw, and is full-fed at the beginning of August; it spins a slight cocoon on the surface of the earth, and remains in the CHRYSALIS state throughout the winter.

The MOTH appears in June; nearly all the localities given for this insect are northern ones; but it has been taken at Stowmarket, in the east, and in Gloucestershire, in the west; it also occurs in Scotland, and Mr. Birchall says it is widely distributed and common in Ireland. (The scientific name is *Melanippe tristata.*)

Obs.—I possess recently disclosed specimens in which all the parts which are usually black, have a smoky-gray appearance.



321. The Chalk Carpet (*Melanippe procellata*).

321. THE CHALK CARPET.—The fore wings are white, with various dark markings, the ground colour of which is smoky-brown, varied with red-brown; the sub-costal ray is red-brown, and the extremities of the parallel rays are of that colour; the dark markings are, first, a triangular blotch at the base of the wing; secondly, a large shapeless blotch on the middle of the costa; and thirdly, a broad hind-marginal band, interrupted in the middle by a large white blotch; there are a few brown spots on the costa, and a few rivulet markings on the disk: the hind wings are white, with a few transverse dark lines, especially towards the hind margin, with which they are parallel. The head and thorax are dark brown, the body white.

The EGGS are laid toward the end of July, and are hatched in a very few days. When full grown the CATERPILLAR is cylindrical and elongate. It rests in nearly a straight position, which it retains when disturbed. The head is rather small, brown, dotted with black, and having two divaricating darker stripes nearest together on the crown, and most distant at the mouth. The body is wainscot-brown, lighter from the tenth to the thirteenth segments, both inclusive. There is a medio-dorsal varied stripe, commencing indistinctly on the third segment, and dilating into a conspicuous dark blotch at the commencement of the sixth, seventh, eighth, and ninth segments; before and after each of these blotches the medio-dorsal stripe assumes a reddish hue, and again assumes a deep black immediately after the red; on each side of this varied medio-dorsal stripe is a paler stripe, also slender, and beyond these are three smoke-coloured stripes, rather diffuse and ill-defined; the first of these on each side passes into the head, and terminates on each side of the mouth, as already

described. On the back of each segment are two or four black dots; the sixth, seventh, eighth, and ninth segments are slightly darker than the rest; the spiracles are black. It feeds on the traveller's joy (*Clematis vitalba*), and is full-fed about the middle of September, when it spins a slight web, and remains in the CHRYSALIS state throughout the winter.

The MOTH appears on the wing in May, June, and July, principally in June; it occurs in the southern counties of England, but not in the north, nor have I seen specimens from Scotland or Ireland. (The scientific name is *Melanippe procellata.*)



322. The Sharp-angled Carpet (*Melanippe unangulata*).

322. THE SHARP-ANGLED CARPET. — The basal portion of the fore wings is smoky-brown, marbled with paler brown and gray, and bounded by a zigzag white line; the middle of the wings is occupied by a broad band which includes the discoidal spot, and is sharply angled on its outer, and concave on its inner margin; beyond the dark band is a white bar, bent in the middle, and double or intersected throughout by a faint brown line; the hind margin of the wing is occupied by a smoky-brown band, which has a median zigzag white line, a pale oblique streak at the tip, and a pale and vague blotch in the middle; the hind wings are grayish white, with a faint discoidal spot and a double smoke-coloured bar on the hind margin. The head, thorax, and body are marbled with gray and brown.

The CATERPILLAR is stout, rather attenuated at both ends, and rests with the head tucked in the anterior part of the body, when disturbed, being curled in, or carved in the manner of the Ionic volute. The head is brown, beautifully dotted, and marked with black. The body is smoky-brown, delicately mottled and varied; the back may be said to have seven smoke-coloured stripes, alternating with paler stripes; the medio-dorsal stripe is not perceptible on either the second or thirteenth segments, but is distinct and uninterrupted on the third, fourth, fifth, sixth, seventh, and eighth segments; it is suddenly dilated anteriorly, and more gradually posteriorly, and is extremely attenuated and scarcely perceptible on the remaining segments. On each of the interstices between the segments commencing between the fourth and fifth is a short transverse reddish band, terminating at each extremity by a longitudinal black spot; the remaining smoke-coloured stripes, three in number, on each side of the median stripe, are scarcely susceptible of verbal definition. Each segment of the belly after the fourth has a cluster of black dots, which are not present in any other British species of the genus; but Mr. Hellins informs me that markings of the same colour and character occur in *Cidaria picata.* It feeds on the common chickweed (*Alsine media*), and is full-fed at the beginning of August. It spins its cocoon on or just under the surface of the earth, and remains in the CHRYSALIS state all the winter. In captivity it is sometimes double-brooded, but not in a state of nature.

The MOTH appears on the wing in June; it occurs in many of our English counties, but not yet observed in Scotland. Mr. Bristow has taken it near Belfast in Ireland. (The scientific name is *Melanippe unangulata.*)



323. The Wood Carpet (*Melanippe rivata*).

323. THE WOOD CARPET.—The basal portion of the fore wing is smoky-gray, bounded by a slender curved white line, and beyond is

a slender gray bar; then a double white bar, that is, a white bar intersected by a slender smoke-coloured line; immediately following this is a broad smoky-brown band, which includes the discoidal spot, and is traversed by several slender waved lines, both lighter and darker; beyond the dark band is a curved white bar, intersected by a faint gray line, which is often interrupted or broken up into dots; beyond this is a broad marginal band of a blue-gray or lead-colour, and intersected by a slender zigzag white line; on the extreme margin is a series of black spots; the fringe is brown-gray, interrupted with pale gray, and having a conspicuous white spot at the apical angle; the hind wings are pale gray, rather darker at the base, and having three darker waved lines before the middle of the wing; on the first of these the discoidal spot is situated; there is a broad marginal blue-gray or lead-coloured band, intersected by a slender zigzag white line; the extreme margin and fringe are as in the fore wings. The head and thorax are brown-gray, the body smoky-gray, with two nearly black spots placed transversely on the back of each segment.

The head of the CATERPILLAR is of nearly the same width as the body, which is uniformly cylindrical; it rests generally in a slightly bent posture, but when disturbed tucks in the head, thus giving to the anterior portion of the body the figure of the Ionic volute. The colour of the head is dusky-brown, with two darker brown lines meeting on the crown; the colour of the body red-brown or dingy brown, beautifully variegated and mottled; the second and third segments have a median black line, and on each side of this is a direct white line, which extends into the fourth segment; on each of the four succeeding segments is a somewhat horse-shoe shaped median white mark; these marks might be called lozenge-shaped, but they are open at the posterior extremity; on the tenth segment, and extending thence to the extreme tip of the thirteenth, is a broad median dark brown stripe, and separated from this by a space equal to its own diameter, is a white stripe of corresponding length, terminated at its anterior extremity by a somewhat comma-shaped jet black mark, which has a white dot in the head of the comma; on each side of the median markings is a series of white dots the third and fourth segments have two dots each, the fifth, sixth, seventh, and eighth have four each, the ninth and following ones have two each; there are several indistinct stripes and dots on each side of the body. It feeds on the great hedge bedstraw (*Galium mollugo*), and is full-fed about the 22nd of July, when it spins a cocoon on the surface of the earth.

The MOTH appears on the wing in July, and is common in most of the southern counties of England, and also occurs at Manchester, in the lake district, and near Durham. It is reported by Mr. Birchall from Cork, on the authority of Mr. Clear, and I think not from Scotland. (The scientific name is *Melanippe rivata.*)

Obs.—The species is sometimes double-brooded in captivity, but never in a state of nature.



324. The Common Carpet (*Melanippe subtristata*).

324. THE COMMON CARPET.—The basal portion of the wing is smoky-gray, bounded by a slender waved white line, and beyond this is a broadish gray-brown bar; then a double white bar, and then a broad smoky-brown band, which includes the discoidal spot, and is traversed by darker and whiter slender lines; beyond this dark band is a curved white bar, intersected by a distinct and continuous dark gray line; beyond this is a broad marginal band of a brown-gray tint, intersected by a slender zigzag white line; on the extreme margin is a series of narrow linear black spots, not always very distinct; the fringe is brown-gray, interrupted with pale gray: the hind wings are pale gray, darker at the base, the darker basal portion including the discoidal spot; the white bar following this is intersected by a slender darker line; there is a

brown-gray marginal band intersected by a slender zigzag white line; the extreme margin and fringe are as in the fore wings: the head and thorax are brown-gray, the body smoky-gray, with two nearly black spots placed transversely on each segment.

The head of the CATERPILLAR is nearly of the same diameter as the body, which is uniformly cylindrical; the caterpillar generally rests in a nearly straight position, but when disturbed, tucks in its head very tightly, thus giving to the anterior portion of the body the figure of the Ionic volute. The colour of the head is pellucid smoky-brown, dotted with black, and having two darker brown lines which meet on the crown; the body is brown, beautifully variegated, and mottled; the second, third, and fourth segments have a median black line, and on each of the six succeeding segments is a somewhat horse-shoe shaped median white mark; the last of these terminates in a median brown stripe, which extends through the eleventh and twelfth segments, and to the extreme tip of the thirteenth; these marks might be called lozenge-shaped, but they are open at the posterior extremity; the enclosed space in each is brick-red, with a median transverse black bar; there are two or four white dots on the back of each segment, and numerous waved markings of different shapes on the sides. It feeds on the great hedge bedstraw (*Galium mollugo*), and is full-fed about the 30th of June, when it spins a slight cocoon on the earth, and changes to a CHRYSALIS.

The MOTH appears in May, and again in July, towards the end of the month; it is of common occurrence in all parts of the United Kingdom, whence a report has been obtained. (The scientific name is *Melanippe subtristata.*)

Obs.—This species is double-brooded, both in a state of nature and in captivity. The question whether the two species of *Melanippe*, *M. rivata* and *M. subtristata*, are identical or distinct, is one which has often occupied the attention of our most acute lepidopterists; I confess myself unable to appreciate the reasons that have been assigned for considering them identical, and have, therefore, always kept them separate; this opinion, however, has been formed almost entirely on superficial grounds, and without that minute attention to distinctive characters, on which alone such a conclusion should be grounded. It is, therefore, with extreme pleasure that I now cite from the memoranda of Mr. Hellins the following excellent observations:—"Between the caterpillars of *Melanippe rivata* and *M. subtristata*, there is, at first sight, as great a similarity as exists between the same insects in the perfect state; the ground colour of both is the same, varying from a pale fawn-colour, through a greenish brown, to a dull green, and even sometimes to a bright green, the lines and borders of the markings being of a deeper tint of the ground colour, and often tinged with a good deal of red; in both, the segmental divisions are light red, though this, indeed, may be observed in a very great number of grey and brown caterpillars, and in both the dorsal markings are of the same shape, namely, dark longitudinal lines, bordered with light on the front and hind segments, and on the intermediate ones are blunt white arrow-heads,* pointing forwards and placed at the segmental divisions, the white being clearest and brightest at the point, enclosing a diamond-shaped spot of a dark tint of the ground colour, which at its hinder end runs indistinctly into the broken dorsal line, and themselves enclosed on the front edge by a dark suffused V-shaped mark, the apex of which runs into the dorsal line, and the sides appear to reach down to the spiracles, but become indistinct when examined with a lens.

"So far these species are alike, but a careful examination of the number of specimens during the past two or three years has led to the conclusion that they differ as follows: The caterpillar of *M. rivata*, as might be expected from the relative size of the two perfect insects, is invariably the larger; it is also

* Perhaps lozenges would be a better word, but the other was chosen on account of the opening of the hinder end, which seems to admit the shaft of the arrow.

more delicately tinted, and has the lines better defined; its dorsal arrow-heads, moreover, are but four in number, being placed on the divisions between the fifth and ninth segments; the seeming arrow-head between the fourth and fifth segments, on examination with a lens, shows no white; and barely an interruption of the dorsal line; and the dorsal line, which recommences between the ninth and tenth segments, is not preceded by any clear white. In *M. subtristata*, the whole back is generally more clouded, the sub-dorsal lines which form the boundaries of the white arrow-heads not being defined; the arrow-head mark between the fourth and fifth segments in *M. subtristata*, when examined with a lens, becomes quite distinct, and though not so perfectly formed as the four others that follow it, is yet quite plain and complete; between the ninth and tenth segments, also, there is a well-defined half arrow-head, the hind part of which runs into the lines on the hinder segments, the entire number of arrow-heads being thus five and a half, instead of only four. The difficulty of obtaining both species in the same stage, at the same time, no doubt renders this comparison less perfect than it might be, could they be placed side by side; but the first or June brood of caterpillars of *M. subtristata* are all gone down before the single brood of *M. rivata* have assumed the characteristic markings; and these, again, are gone down before the August and September caterpillars of *M. subtristata* are available for comparison. It is well to mention that among some hundreds of the perfect insects of both species which have been bred by four or five different entomologists during the last three years, there have occurred no intermediate varieties whatever; *M. rivata* varies, indeed, in having the gray border of the hind margin of its wings sometimes tinged with blue, sometimes with brown, but the white lines always preserve their distinctive width, and the under side is always lighter than in *M. subtristata*; the only variety that has been observed was one which, far from having the white lines broader than usual, had the dark bands wider. Of course, worn specimens, which, having lost many of their scales, approached *M. rivata* in paleness, are not worthy of notice."



325. The Silver-ground Carpet (*Melanippe montanata*).

325. THE SILVER-GROUND CARPET.—The fore wings are creamy-white with an ochre-gray blotch at the base, and an irregular ochre-gray median band, which includes a creamy-white blotch and a distinctly black discoidal spot; the costal margin has several transverse brown spots, and the hind margin has a broad but pale band of smoky-brown, intersected throughout by a scalloped white line: the hind wings are nearly white with a discoidal spot and a few indistinct transverse markings: the head, thorax, and body are creamy-white, the body having two black spots placed transversely on each segment.

The CATERPILLAR is almost uniformly cylindrical, and rests in a nearly straight position, but tucks in the head very tightly when disturbed, the anterior part of the body then assuming the form of the Ionic volute. The head is pale brown, with numerous black lines; the body pale brown, with a number of variously-coloured markings; there is a narrow median stripe traversing all the segments except the first and thirteenth; this median stripe is parti-coloured; it is blood-red at the interstices between each two segments beginning from the fourth, and the blood-red portion is always succeeded by a jet-black portion, and the other parts are smoke-coloured; the sides have two approximate rich brown rivulet stripes, both edges of which are delicately margined with black; these stripes extend from the head to the thirteenth segment; below these is a paler stripe, and the belly is also pale, but of a different hue; between the median stripe and

the two approximate lateral stripes is a pale brown broader stripe, interrupted with various black markings; on the back of the seventh, eighth, and ninth segments is a conspicuous black V-shaped mark, the apex of the V pointing backwards, and each terminating in one of the blood-red marks already described; these three V's are very large, obscuring, on the three segments where they occur, the stripes previously described, and below them are five black dots on each side of the stripe.

The EGG is laid in the autumn, on the leaves of the primrose (*Primula vulgaris*), on which this caterpillar hybernates, and it is full-fed at the end of March: this is the only species of the genus that hybernates. Mr. Hellins remarks that this caterpillar is always to be distinguished by its having but three perfect dorsal markings instead of four, which is the normal number in the genus *Melanippe*.

THE MOTH appears on the wing throughout the summer, and is common in England, Scotland, and Ireland. (The scientific name is *Melanippe montanata*.)



326. The Galium Carpet (*Melanippe galiata*).

326. THE GALIUM CARPET.—The fore wings are white, with a smoky-gray blotch at the base; the lower half of this is very pale, and there is a smoky-gray median band, somewhat indented on its inner margin, and much indented and angled on its outer margin; this band is divided into six bars by means of zigzag black lines; the third of these bars, counting from the base of the wing, is the broadest, and of the purest gray, and also contains the long and narrow discoidal spot; the other bars are tinged with brown; there is a marginal black line on each side of the median band; the costal margin has a blackish cloud half-way between the median band and tip, and there is another in the middle of the hind margin; this includes two white lunules: the hind wings are pale gray, transversely clouded with darker gray, and having a small but distinct discoidal spot: the head, thorax, and body are smoky-gray.

The CATERPILLAR is almost uniformly cylindrical, and generally rests in a slightly curved position, but when disturbed or irritated it tucks the head in very tightly, so that it touches the tenth segment, giving the anterior part of the body the form of the Ionic volute. The head is pale brown, with two broadish dark stripes united on the crown, but widely separated at the mouth; the rest of the head is dotted with black: the body is brown, with parallel stripes of different shades extending its entire length; the median stripe is almost black, and on each side of it is a paler stripe; in each of these paler sub-median stripes are four black spots, one each on the anterior edge of the sixth, seventh, eighth, and ninth segments; again outside each of these sub-median stripes is a very pale stripe, almost white, then follows a broader, more diffuse, and more irregular double brown stripe, perhaps more precisely described as two brown and closely approximate rivulet stripes, a very delicate pale stripe passing between them; then follows a paler stripe, in which are situated the spiracles; and finally, the belly is paler, but striped much in the same way as the back. It feeds on two species of bedstraw (*Galium verum* and *G. mollugo*), and is double-brooded; the second brood of caterpillars are full-fed on the 5th of September. Mr. Buckler has represented an extremely beautiful variety, in which the black dots on the back form the nuclei of variegated black, red, and white markings.

The MOTH appears on the wing in June, and has been taken in most of our English counties, especially in the chalk districts of Kent and Surrey: I have sometimes found it so abundant in the former, that it has become almost a nuisance when collecting, the captures being incessant, and each capture when examined proving to be a *Galiata*. It is also found in Ireland, especially on the coast. (The scientific name is *Melanippe galiata*.)



327. The Garden Carpet (*Melanippe fluctuata*).

327. THE GARDEN CARPET. — The fore wings are gray, with a dark smoky-brown blotch at the base, and another much larger on the middle of the costal margin; this latter includes the discoidal spot, which is always present but indistinct; from the costal blotch tc the inner margin of the wing there is a smoky-gray cloud; beyond the blotch the wing is irregularly clouded and barred with smoky-brown: the hind wings are clouded and transversely barred with smoky-brown, and have a discoidal spot: the head, thorax, and body are gray: the body has two indistinct brown spots placed transversely on each segment.

The CATERPILLAR is slightly attenuated towards each extremity; it generally rests in a slightly bent posture: it is very variable in colour, brown, gray, or green. I describe the brown type: the head delicately marked transversely with dark brown, median stripe interrupted and of various colours, of which brick-red and deep black are most conspicuous; a small oblong red space surrounded by dingy white, occupies the middle of the hind margin of each segment after the fourth, and is united to a black spot similarly surrounded on the anterior margin of the succeeding segment; the two combined constitute what Mr. Hellins terms the arrow-head markings; the dorsal surface of the tenth, eleventh, twelfth, and thirteenth segments is very pale, forming a conspicuous pale patch, and this is continued beyond the posterior margin of the ninth segment; each of the segments after the fourth has four distant and distinct white dots arranged in a square; those on the tenth, eleventh, and twelfth segments are surrounded with small back markings; the sides are pale, the belly is also pale, but has darker stripes: it feeds on the several varieties of cultivated cabbage (*Brassica*), or nasturtium (*Tropæolum majus*), and other garden plants, and is double-brooded both in a state of nature and in captivity; the second brood of caterpillars is full-fed at the beginning of September.

The MOTH flies throughout the summer: it is the commonest of all our garden geometers in England, Scotland, and Ireland. (The scientific name is *Melanippe fluctuata.*)



328. The Royal Mantle (*Anticlea sinuata*).

328. THE ROYAL MANTLE.—The fore wings are parti-coloured; there is a large dark and somewhat triangular blotch at the base, the prevailing tint of which is dark leaden-brown, approaching to black, but it is divided by a transverse median bar of two colours, brown or smoky-gray towards the base, rust-coloured gray externally, where it is bounded by a double slender bent line, the inner half of which is nearly black, the outer half white; beyond this basal blotch there is a large creamy-white area, restricted at the costa, but expanding before the middle, and continued to the inner margin; beyond this is an almost square black costal blotch, sprinkled with gray, and bounded by a double zigzag black line, which extends to the inner margin; beyond this is a rust-coloured bar, broad at the costa, but gradually diminishing in width to the anal angle; then follows a zigzag white line, and finally a mixed marginal band which has a darker central cloud: the hind wings are grayish-white, with a transverse zigzag umber-brown line parallel with the hind margin. There is a narrow and scarcely perceptible discoidal spot on all the wings. The head and thorax are almost black, the body creamy-white. Such are the principal markings of this beautiful moth, on which the older collectors conferred the name of the Royal Mantle.

The head of the CATERPILLAR is slightly divided on the crown, as broad as the body:

the body is uniformly cylindrical, without humps or warts. The colour of the head is yellowish-green, with mottled black markings; the body is yellowish or bright green, with two black dorsal stripes scarcely so broad as the green median space between them; the spiracles are black; the legs and claspers pale green; all parts of the body emit fine short scattered black hairs. It feeds on lady's bedstraw (*Galium verum*), and is full-fed by the end of August, when it spins a slight web among the leaves or flowers, and changes to a short obese CHRYSALIS, the wing-cases of which are very ample, and of a dark brown colour; the body is reddish.

The MOTH flies in June. I have taken it in Birchwood, Kent, and Mr. Brown has sent me the caterpillar from Cambridgeshire, but it is a very local insect in England, and I do not hear of its occurrence in Scotland or Ireland. (The scientific name is *Anticlea sinuata.*)



329. The Flame (*Anticlea rubidata*).

329. THE FLAME.—The fore wings have a small triangular dark brown blotch at the base, edged with white; then a rust-coloured band, then a dark brown bar delicately edged on both sides with white, and having a distinct discoidal spot attached to its outer margin, and this also is generally edged with white; then a brown-grey band, which sometimes bears a rust-coloured shade about the middle, then a dark brown bar, very distinct at the costa, but continued to the inner margin only as a zigzag black line; and lastly a broad rust-coloured marginal band, intersected by a slender scalloped pale gray line: the hind wings are grayish-brown with transverse waved lines, both darker and lighter; the head, thorax, and body are grayish-brown, the body having a pale margin, and two darker spots on each segment.

The EGGS are laid at the end of June or beginning of July, on the great hedge bedstraw (*Galium mollugo*), and other species of the same genus; they are hatched in ten or twelve days.

The CATERPILLARS are full-fed in August, and then rest in nearly a straight position. The head is semi-porrect, of almost exactly the same width as the body, and the body of uniform thickness throughout and cylindrical. The colour of the head is smoky-brown, with a brown V-shaped mark on the face, pointed backwards, and several black dots and hairs; the body is red, brown, or gray, but in either case beautifully variegated; on the body is a median series of five lozenge-shaped or arrow-headed markings, each having a dark centre, a pale disc, and a slightly darker margin; beyond and in continuation of these, and extending from the ninth segment to the anal flap, is a medio-dorsal black stripe; the entire back may be described as having five longitudinal stripes; of these the medio-dorsal passes through and partly comprises the arrow-headed markings and the black stripe already described; the remaining stripes are somewhat sinuous, of a reddish brown colour, and bordered on each side by black dots; the legs are paler, the claspers slightly darker. It goes into the ground to change to a CHRYSALIS, and forms a small earthen cocoon.

The MOTH flies in June, and occurs in several counties north, south, east, and west, but I think neither in Scotland nor Ireland. (The scientific name is *Anticlea rubidata.*)



330. The Shoulder Stripe (*Anticlea badiata*).

330. THE SHOULDER STRIPE.—The fore wings are sienna-brown, with the base and a broad hind-marginal band umber-brown, and a median band pale wainscot-brown; this

latter includes a distinct but very small round discoidal spot; about the middle of the marginal band is a snow-white lunule; with the exception of the pale median band, every part of the wing is traversed by slender dark brown transverse lines: the hind wings are gray, tinged with brown, and have a small discoidal spot, slender waved transverse lines across the middle, and a broad marginal band rather darker, and intersected by a sinuous pale line; the margin itself is very distinctly scalloped and dark brown; the head and thorax are rich umber-brown, the body pale brown at the base, rather darker at the tip; there are two dark spots placed transversely on each segment.

The EGGS are laid in March, on the buds or stems of the dog-rose (*Rosa canina*).

The CATERPILLAR is full-fed at the end of May, when it rests in a nearly straight position, attached by the claspers only. The head is semi-porrect, slightly notched on the crown, slightly narrower than the body; the body is of uniform size throughout, slightly depressed, and entirely without humps. At first, all the caterpillars are green, afterwards they vary slightly: the colour of the head is orange, with a large black spot on each side just above the ocelli; the dorsal area of the body is green, sometimes exquisitely shaded, more especially towards the sides, with purple; the second segment has a slender medio-dorsal pale line, on each side of which are four white dots arranged in a square, and below these on each side are two other white dots placed transversely; the third and fourth segments have each a transverse series of six white spots on the back, and two placed longitudinally on each side; the fifth, sixth, seventh, eighth, ninth, tenth, eleventh, and twelfth segments have each four dorsal white dots arranged nearly in a square; the thirteenth segment has a transverse series of six similar dots, and every segment has a lateral white dot at the junction of the dorsal and ventral area; the anal flap is rounded, and dark purple-brown; the sides of the second, third, and fourth segments are reddish-brown; the sides and ventral surface of the other segments are dingy-white; the spiracles intensely black; the legs green; the ventral claspers pale green, with an intensely dark purple brown blotch on the outside; the anal claspers are dingy, with a similar blotch. It feeds on the leaves of the dog-rose, and descends to the ground and changes to a CHRYSALIS on the surface of the earth in an earthen cocoon.

The MOTH appears on the wing in April, and is of frequent occurrence in some of our English counties, and Mr. Birchall says it is very common in Ireland. (The scientific name is *Anticlea badiata.*)



331. The Streamer (*Anticlea derivata*).

331. THE STREAMER.—The fore wings are purple-brown, with a paler median area, and having a delicate gloss over the whole surface; they have two darker bars, the first near the base, short, narrow, and rather obscure, the second before the middle of the wing, and very strongly pronounced; beyond the middle of the wing is a dark brown blotch on the costa, the two margins of which are continued as mere lines to the inner margin; the inner of these lines is simply scalloped, the outer is much angled, the angle projecting almost to the middle of the inner margin; midway between the second bar and the first of these lines is a small but distinct dot-like discoidal spot; the hind wings are gray, with a purple-brown gloss, but with scarcely any markings; the head, thorax, and body have various shades of brown, the margins of the segments being pale.

The EGGS are laid in March or April, on the buds or stems of the dog-rose (*Rosa canina*), on the leaves of which species the caterpillar feeds; the CATERPILLARS are full-fed in May, when they rest in a straight or but slightly

bent position; the head is semi-porrect, scarcely so broad as the body; the body is cylindrical, but slightly narrowed anteriorly; the skin appears tight, and has but little appearance of wrinkles or skinfolds. The colour of the head is light red, tinged with green in the middle of the face; the body is delicately green, with red blotches as described below; the first originates immediately behind the head, and is there of the same breadth as the head, but it narrows to a point on the back of the fifth segment; others—three, four, or even five in number—form a longitudinal medio-dorsal series, and others sometimes appear placed transversely on the tenth and thirteenth segments; the legs are pinky-red; the claspers green, with a red blotch on the outer side; it descends the rose-bush, and changes to a CHRYSALIS in the earth.

The MOTH appears in April in most of our English counties, and occurs also in Scotland, and in the county Wicklow in Ireland. (The scientific name is *Anticlea derivata.*)



332 The Barberry Carpet (*Anticlea berberata*).

332. THE BARBERRY CARPET.—The fore wings are gray, with very numerous markings of umber-brown of different shades; near the base is a short bar, both margins of which are darker than the median area; this bar is followed by a gray space, which includes two elbowed darker lines; then follows a dark umber-brown bar, and then a gray band scalloped at the sides and interrupted at the costal extremity, and in the middle; the middle of this band is the centre of the wing; a short distance beyond this band is a sharply-angled zigzag black line; there is a broad pale band on the hind margin, except at its costal extremity, where an oblique division of colours takes place at the very tip of the wing, the costal area of the tip being dark, the hind-marginal area pale gray; the hind wings are pale gray-brown, with several darker but pale zigzag lines parallel with the hind margin: the head, thorax, and body have the same shades of colour disposed transversely.

The CATERPILLAR is extremely sluggish, and disinclined to move; when compelled to do so, it generally drops from its food-plant suspended by a thread; it rests with its claspers firmly attached, but most commonly has the legs free, the body being bent double, and the legs being brought almost or quite into contact with the ventral claspers; sometimes both the anterior and posterior segments are straight, the intervening segments constituting a loop; the head is partially concealed by the anterior margin of the second segment, it is rounded on the crown, is of somewhat less diameter than the body, and is slightly hairy; the body is obese, short, and rugose, the rugosity occasioned by each segment having an elevated transverse skinfold on which are situated several warts, each wart emitting a slender bristle. The colour is various; the prevailing varieties are: *first*—a pale raw-sienna brown, with three dorsal stripes of a somewhat darker colour, all of them indistinct, and the median one very slender: *secondly*—a brighter or burnt-sienna brown, with two broad, dorsal, longitudinal umber-brown stripes, and the faintest possible indication of a slender median stripe: *thirdly*—a gray or putty-coloured ground colour, thickly sprinkled with black, and having on each side of each segment an indication of a large crescentic white mark; in the last variety the base of the legs is black, and in all the varieties the head is beautifully tesselated, the tesselations in the brown specimens being a darker shade of the same colour, those in the gray specimens being pure black. It feeds on the common barberry (*Berberis vulgaris*), appearing in May. The larvæ of the second brood are those from which I have taken my description; they were full-fed at the end of September.

The MOTH is double-brooded, appearing in May, and again in August; it has been taken in Essex, Suffolk, and Cambridgeshire, but not in the north of England, in Scotland, or

in Ireland. (The scientific name is *Anticlea berberata.*)



333. The Red Carpet (*Coremia munitata*).

333. THE RED CARPET.—The antennæ of the male are strongly pectinated more than half their length; the tips are simple; the fore wings are slightly falcate; they have a reddish blotch at the base, then a narrow gray band, then a broad reddish band with darker margins, and a long discoidal spot of the same darker tint, and delicately margined with white; the inner margin of this band is concave, the outer sinuous; lastly, there is a broad gray marginal band traversed throughout by a slender waved white line, within which white line the marginal band is whitish-gray, and outside the white line pinkish-gray; at the extreme tip of the wing is an oblique streak, above which the gray tint is whiter, below it redder and darker: the hind wings are dingy-gray, with waved transverse markings both lighter and darker; the head, thorax, and body are dingy-gray.

The Rev. Joseph Greene has reared this moth from the egg, which was hatched in June; the young CATERPILLARS fed on groundsel during the autumn; they grew very slowly; before winter they left off eating altogether, but in early spring again ate the groundsel, and were full-fed before the end of March. The caterpillar when full-fed is an inch in length, the ground colour dull green, or brown, but very variable; the segments pink or flesh-coloured; the body is slightly sprinkled with black dots, with two very distinct blotches on the sixth and seventh segments, the latter being the largest. It spins up in moss, and turns to a brown CHRYSALIS.

The MOTH appears in June and July, and seems to be a northern insect; it has been taken most abundantly in Orkney. I have seen in the boxes of a collector who had summered in Orkney, hundreds of this species, but so bad was their condition, that I could not select a dozen worth preserving; there are several localities in Scotland, and some in the northern counties of England. Mr. Birchall also reports it as taken by Mr. Bristow at Belfast. (The scientific name is *Coremia munitata.*)



334. The Flame Carpet (*Coremia propugnata*).

334. THE FLAME CARPET.—The antennæ of the male are slightly pectinated; the fore wings have a chocolate blotch at the base, then a pale gray band almost white, then a chocolate band barred transversely with two shades, and including an elongate white discoidal spot; this band is concave on its inner, and doubly angled on its outer margin; lastly, there is a broad gray marginal band traversed through half its length by a delicate waved white line; the hind wings are dingy-gray, with transverse markings; the head, thorax, and body are gray, the margins of the segments chocolate-brown.

The CATERPILLAR is figured in Sepp's exquisitely beautiful work on Dutch Lepidoptera; it is represented feeding on a species of cabbage (*Brassica*). The ground colour is a reddish-gray, with a medio-dorsal series of triangular markings of a rosy-pink, and a lateral stripe in the region of the spiracles of a dingy-yellow.

The MOTH flies in May and June, and again in August, and occurs in most of our English and some of our Scotch counties. Mr. Birchall found it abundant at Powerscourt, in Ireland. (The scientific name is *Coremia propugnata.*)



335. The Red Twin-spot Carpet (*Coremia ferrugata*).

335. THE RED TWIN-SPOT CARPET.—The

antennæ are pectinated in the male; the fore wings have a reddish blotch at the base, then a gray band intersected by several transverse markings, then a broad reddish bar also traversed by transverse markings, and including a very indistinct discoidal spot; the band is bordered by a slender pale, almost white line, and this again by an equally slender brown line; lastly, there is a broad hind marginal gray band which includes many waved lines of different shades, a rust-coloured costal blotch and a double black spot within the hind margin about the middle: the hind wings are dingy gray, with various transverse markings: the head, thorax, and body are variegated with gray and brown, the body having two blackish spots placed transversely on each segment.

The EGGS are generally laid on the stems of ground ivy (*Glechoma hederacea*), on the leaves of which plant the caterpillars feed; the period in the egg state varies from ten to twenty days, according to the temperature; the cold east winds, which so frequently prevail in the spring, greatly retarding their emergence. The full-fed caterpillar rests with the anterior extremity rigidly extended, but often in a slightly arched position; when annoyed, it tucks in its head, and rolls up the anterior part of its body in the form of the Ionic volute; the legs are crowded together, and closely appressed to the mouth; the head is prone, not conspicuously notched on the crown, and nearly of the same width as the body; the body is of nearly the same width throughout, and uniformly cylindrical, with the exception of a lateral skinfold which extends its whole length; it is without humps, but, in common with the head, has a few small scattered warts, each of which emits a single small bristle; the head is putty coloured, freckled with black on the face, and having a darker stripe on each cheek; the colour of the dorsal area of the body, as far as the ninth segment, is dingy brown, but this hue appears to be caused by the somewhat tessellated ornamentation: this consists, in the first place, of a medio-dorsal stripe, narrow and almost thread-like on the third, fourth, fifth, tenth, eleventh, and twelfth segments; on the sixth, seventh, eighth, and ninth segments, the medio-dorsal stripe is interrupted, and reduced to a median intensely black spot; each of these black spots is surrounded by a paler area, dilated laterally, but attenuated at the extremities; a dorsal series of lozenge-shaped markings results, as far as regards these four segments; on each side of this dorsal ornamentation are three slender rivulet stripes, all of them sesquialterous or semi-double, but neither of them very conspicuous; the ventral area, extending to and including the spiracles, is putty-coloured, but the spiracles themselves are intensely black, and surrounded by a paler area; there is a medio-ventral pale brown or reddish stripe, containing three black spots, and extending from the fifth to the twelfth segment; on each side of this medio-ventral stripe the ground colour is extremely pale, and the pale part is bounded by a double sinuous darker stripe, very similar to those on the dorsal area: this commences at the base of the third pair of legs, and ceases at the base of the ventral claspers; this is again succeeded by a paler ground colour, and this again by a frequently interrupted and most irregular stripe, which contains five conspicuous black spots, and terminates in a larger linear spot close to the ventral claspers. The CATERPILLAR spins a slight web among the stolons of the ground-ivy, and in this changes to a smooth brown CHRYSALIS.

The MOTH appears in May, and again in August; it is abundant in England, Scotland, and Ireland. (The scientific name is *Coremia ferrugata*.)



336. The Dark-barred Twin-spot Carpet (*Coremia unidentata*).

336. THE DARK-BARRED TWIN-SPOT CARPET.—The antennæ are distinctly pectinated in the male; the fore wings have a brown blotch

at the base, then a grand band intersected by two ferruginous bars, the inner of which is broader and more distinct than the outer, then a broad smoky-black band in which the discoidal spot is generally obliterated; this band is bordered with white; lastly, there is a broad gray hind-marginal band which includes two slender waved rust-coloured lines, a rust-coloured costal blotch, and a double black spot within the hind margin about the middle; the hind wings are dingy-gray, with various transverse markings; the head, thorax, and body are variegated with gray and brown; the body has two blackish spots placed transversely on each segment.

N.B.—The broad median band is sometimes purplish red.

The EGGS are laid on lady's bedstraw (*Galium verum*), in July, and the CATERPILLAR feeds freely on that plant as well as on sweet woodroffe (*Asperula odorata*); my specimens were full-fed on the 30th of August, and then rested in a posture slightly bent, and with the head usually porrected, but bending downwards in a prone position on the slightest touch. The head is flat, exactly of the same width as the second segment, but not so wide as the following; the body is slightly depressed, without excrescences, but having a manifest lateral skinfold and numerous minute warts, each of which emits a bristle; these warts and bristles are eight or ten on each segment; the colour of the head is pale testaceous-brown or putty-colour, with dark brown spots, some of which group together and form two longitudinal stripes, one on each cheek; the body is pale testaceous-brown or putty-coloured, with numerous dark brown dots, which associated, form lozenges on the back, and longitudinal rivulet markings on the sides; the perfect lozenges on the back are four in number, and each has a quadrate black spot in the centre; there are two principal lateral rivulet stripes, both of them double; the lower of these comprises the black spiracles, and terminates in the anal claspers; a long black spot on each side runs into the ventral claspers; the double rivulet markings of the ventral surface are five in number; of these the median one is the narrowest and the palest in colour, and its component parts most approximate; the upper double stripe on each side is situated just below the skinfold, it is very interrupted and indistinct, and contains five quadrate black spots, namely, on the fifth, sixth, seventh, eighth, and ninth segments; the warts are pale, and the bristles they emit are black with white tips: my specimens of this caterpillar changed to dark brown glabrous chrysalids in a slight web among dry remains of the food-plant on the surface of the earth.

The MOTH is common in May and June, and again in August, in many of our English counties, and occurs also in Scotland and Ireland. (The scientific name is *Coremia unidentata.*)

Obs.—Since it has been discovered that *Coremia unidentata* occasionally has a purple-red median band very much resembling that of *C. ferrugata*, it has become extremely difficult to define in words the distinguishing characters of the two species: so long as *C. ferrugata* was distinguished by its ferruginous, and *C. unidentata* by its dark brown band, there was no difficulty in separating the two species; but now that *C. unidentata* has been found to vary in this respect, the test character as it was formerly thought no longer continues to be such, and it becomes necessary to breed both species from the egg before the name of the red-banded specimens can be positively pronounced. The same difficulty does not exist with the brown-banded specimens, as I have never seen a specimen of *C. ferrugata* with the brown band. Nevertheless, the practised eye rarely fails to distinguish between the two species: *C. ferrugata* always seems to me more variegated, and to have a greater mixture of colours. Guenée combines the two, making the *unidentaria* of Haworth his variety A, and he adds that although *C. unidentaria* is not essentially different from the type (*C. ferrugata*), except in colour, this is so constant that he would have been tempted to give it as a distinct species, had not Sepp figured both varieties as bred from the same caterpillar: *C. unidentaria* varies a little, but far less than *C. ferrugata*. It ought to be added that the

two caterpillars which I have described from life, and without reference to previous descriptions, are extremely similar in all their characters.



337. The Large Twin-spot Carpet (*Coremia quadrifasciata*).

337. THE LARGE TWIN-SPOT CARPET.—The antennæ of the male are pectinated : the fore wings are fawn-coloured, with a broad median band of a very dark and smoky umber-brown, yet including a still darker discoidal spot and waved lines ; this band is concave, and pretty regular on its inner margin, but sinuous and sometimes having a sharp angle on its outer margin, which is edged with a slender white line ; about half way between this and the hind margin is a scalloped white line not so distinct ; and touching the inner margin of this, about its middle, is a double dark spot ; the fawn-coloured or isabelline ground on both sides the median bar has various indistinct waved markings : the hind wings are dingy-gray, with several transverse rivulet markings, some of them darker, some lighter than the ground colour: the head, thorax, and body are dingy brownish-gray ; each segment of the body having a darker marginal belt delicately bordered with white.

"The caterpillar is yellowish-gray, marbled with brown ; the spiracular line blackish, sometimes interrupted (*Hubner*). On low plants, hawthorn, &c."—*Stainton's Manual*, vol. ii. p. 106.

The MOTH appears in June in the southern counties of England. It was formerly so common about Godalming, in Surrey, that it was turned out of the net when taken ; it has since occurred commonly at Haslemere ; it has been taken by the Cambridge collectors, and by Dr. Bree at Stowmarket. (The scientific name is *Coremia quadrifasciata.*)



338. The Yellow Shell (*Camptogramma bilineata*).

338. THE YELLOW SHELL.—The antennæ are simple in both sexes ; all the wings are yellow ; the fore wings have three slender waved white lines, all of them bordered with a brownish tint ; there is a pale, but not white, zigzag line near the hind margin ; the space between the second and hind white lines is sometimes dark brown ; this is more especially the case near these lines ; there are also many slender waved brown lines and an indistinct discoidal spot : the hind wings are yellow, with two waved white lines apparent only near the inner margin, and many darker lines ; the hind margin is irregularly scalloped ; all the lines are transverse, and all the wings have a slender and continuous dark marginal line : the head, thorax, and body are yellow.

The CATERPILLAR appears to have been seldom observed until M. Guenée gave us the clew to its discovery : it feeds on different grasses by night, secreting itself during the day on the under side of stones, under clods of earth, or at the roots of the herbage during the month of April ; it rests with the head rather prone and bent under ; the head is pale dull green, the dorsal surface of the body glaucous green, with a darker or olive-green medio-dorsal stripe ; this stripe is bordered with greenish-white ; on each side is a slender white stripe, and another of precisely the same colour in the region of the spiracles, which are yellow, and each encircled with a sienna-brown ring ; the ventral area is pale green with a medio-ventral stripe of very pale yellow, and a series of spots which are rose-

coloured or violet, or purple-brown, and sometimes absent; the legs and claspers are of the same colour as the body.

The MOTH appears on the wing in June and July; is one of our very commonest species, occurring in every field, land, and hedgerow throughout the summer. (The scientific name is *Camptogramma bilineata.*)



MALE. FEMALE.

339. The Gem (*Camptogramma fluviata*).

339. THE GEM.—The antennæ are pectinated in the male, the pectinations being very short and inconspicuous. The male has the fore wings clay-coloured, inclining to wainscot-brown, with a narrow transverse median band of a smoky-brown, and including a small black discoidal spot, which is surrounded by a pale ring; there is an oblique smoke-coloured shade at the tip of the wing, descending towards its centre; the clay-coloured area on both sides of the median band is traversed by faint white lines, the two more conspicuous of which are between the band and the hind margin; the first of these is waved, the second zigzag. The fore wings of the female are purple-brown, sometimes inclining to brick-dust-red; the median band is faintly indicated, but the discoidal spot is very conspicuous, rendered so by the ring which surrounds it being snowy-white: the hind wings in both sexes are pale brownish-gray, with waved lines both lighter and darker: in each sex the head, thorax, and body are much the same colour as the fore wings.

I have found the CATERPILLAR of this geometer on the leaves of the common persicaria (*Polygonum persicaria*), but I have not described it from nature, as a very accurate description which I have quoted below was previously published in the "Entomologists' Intelligencer" for 1858: "A lovely female of this species laid me some EGGS on the 24th of July; they were oblong, flattish, and yellow, but changed to a dusky-brown colour on the 1st of August; the following day the CATERPILLARS hatched; at first, they were very dingy, but on the 8th of August became dusky sap-green, and on the 16th assumed their characteristic markings. There were evidently two distinct varieties, one of which had the ground colour of a greenish-gray, tinged with red between the segments; the spiracular line blackish and irregularly interrupted; the back (except the last two segments) dusky, having on the intermediate segments a row of five elongated diamonds of the ground colour, with a dusky dot in each; on the front segments these markings ran into three parallel dusky lines, while on the end segments there were four slender dusky lines arranged in a diamond pattern; the claspers had a dusky stripe running down them. The other variety had the ground colour of a light yellowish-green, quite yellow between the segments; the spiracular line and pattern on the back faintly indicated by dusky-black lines and dots. These caterpillars feed readily on groundsel (*Lenecio vulgaris*), at last eating through stems bigger than themselves; but, as their frass seemed very watery, I doubt whether this is their proper food. They were quiet in their habits, resting on the under side of the leaves, hiding themselves skilfully, and could not be easily dislodged; when disturbed, they curled up the front segments, but not into such a twisted knot as I have sometimes seen in more slender geometers. From the 21st to the 23rd of August the caterpillars, being full-sped, spun up in moss. After having been in chrysalis about a fortnight, the perfect insects emerged. There went down two of the green and four of the darker caterpillars; there have come up again one *C. fluviata* (male), and five *C. gemmaria* (female)—such a narrow risk did I run of missing the solution of this problem. Solved, however, it is, and *C. fluviata* and *C. gemmaria* are hereby declared to be man and wife. I expected to find the difference of colour in the caterpillar would turn out to be a sexual one; this, however, has been contradicted by the result. The CHRYSALIS is brown, smooth, spiked at the tail, and enclosed in a

thin silken cocoon in moss. I have now seen, in all, about fifteen specimens of *C. fluviata*, and six of *C. gemmaria*, and find that the absence in each of what were considered the distinctive markings of the other is not constant; the subapical blotch of *C. fluviata* may be traced more or less distinctly (sometimes quite distinctly) in *C. gemmaria;* while some specimens of *C. fluviata* have the central spot placed in the light ring, only the dark ground of *C. gemmaria* makes this ring shine forth much more brightly, just as a negro's sable skin enhances the whiteness of his eyes. One of my bred specimens, having given me the slip over the edge of the table, was detected in a dark corner of the room by the white spots on the fore wings. As to the other markings, they are, line for line, precisely similar, so that the ground colour alone remains to make the sexes look unlike, and perhaps further breeding may sometimes upset this."

The MOTH occurs occasionally throughout the summer, and there appears to be a succession of broods: it seems to be most common in the vicinity of London, where it frequents the gas lamps, but single specimens have been taken at Lewes, Brighton, Bristol, Derby, and Warrington, and Mr. Birchall informs us it has occurred at Howth and Malahide, in Ireland. (The scientific name is *Camptogramma fluviata.*)



340. The Fern (*Phibalapteryx tersata*).

340. THE FERN.—The antennæ of the male have extremely short pectinations, giving them the appearance of being stouter than those of the female; the fore wings are wainscot-brown, with various umber-brown streaks and dots which are generally seated on the wing-rays; a short oblique streak descends from the tip towards the middle of the wing, and there is a short transverse streak near the base of its inner margin; there is also a zigzag whitish line parallel with the hind margin, and terminating in a white spot near the anal angle; there is a very small brown discoidal spot: the hind wings are paler than the fore wings, with several darker waved lines on the disk, and one zigzag white line near the hind margin; at the base of the wing is a short transverse brown line: the body is wainscot-brown, with a dark brown belt near the base; when the wings are spread out, this belt unites with marks already described on the fore and hind wings in forming a somewhat crescentic ornamentation.

The CATERPILLARS of this species are thus described by Mr. Beauchamp: "During the last week of August and the first fortnight of September, 1861, I beat a number of these caterpillars, in company with those of *Melanippe procellata*, from the common clematis (*Clematis vitalba*) after dark. They are long, slender, and tapering towards the head, which is small, flat, and rounded; the ground colour is very pale grayish-brown; the dorsal line is dark brown, very conspicuous and broad on the head, thence tapering to the end of the fourth segment, where it generally becomes invisible, re-appearing, however, as a gray spot just behind the intersections of the segments, and on the tenth segment broadening into a conspicuous black spot, which tapers to a point forwards. Similar spots, but much fainter, can be traced on the eighth and ninth segments, and sometimes on the seventh. On the hinder part of each of the middle segments is a pair of spots of the same colours as the gray spots before mentioned, with which they form a triangle; the spiracular line is slender, pale, and edged on each side with dark; the sides below the spiracles are paler and rather ochreous. The spots and spiracles are conspicuous, black, ringed with pale; the ventral line is pale, rather broad, and edged with a dark line of considerable but variable breadth; there are numerous longitudinal lines, and on many specimens transverse dorsal shades, especially on the middle segments. In some examples, all the above markings are very indistinct, except the conspicuous black spot on the tenth segment.

These caterpillars come out at dusk to feed, usually holding on the edge of a leaf, and at the slightest touch dropping off, without leaving any silken thread to return by; when on the ground, they curl into a regular St. Catherine's wheel. They are very lively at night, but quite the reverse by day. In habits they closely resemble the caterpillars of *Melanippe procellata*. The cocoon is rather slight and subterranean.

The MOTH appears in June; its range is confined to the eastern and southern counties of England; indeed, it may be supposed dependant on the abundant growth of its food-plant. It has not occurred in the north of England, in Scotland, or Ireland. (The scientific name is *Phibalapteryx tersata*.)



341. The Slender-striped Rufous (*Phibalapteryx lapidata*).

341. THE SLENDER-STRIPED RUFOUS.—The antennæ appear slightly thicker in the male: the fore wings are somewhat falcate, and the tips rather acute; their colour is wainscot-brown, with nine dark lines; the first, second, and third of these are separate and oblique, the others in pairs and very sinuous, more especially the first and third pairs; there is a very obscure, scarcely perceptible, discoidal spot: the hind wings are dingy brownish-gray, with a double transverse slender line parallel to the hind margin, and slightly darker, and there are indications of similar lines on the inner margin, but not continued across the wing: the head, thorax, and body are wainscot-brown.

The MOTH appears on the wing in August, but this is in all probability a second brood; it has been taken at Rannoch, in Scotland, but neither in England nor Ireland. (The scientific name is *Phibalapteryx lapidata*.)



342. The Oblique Carpet (*Phibalapteryx lignata*).

342. THE OBLIQUE CARPET.—The antennæ appear slightly thickened in the male: the fore wings are somewhat falcate, and the tips rather acute; their colour is pale wainscot-brown, with numerous dark oblique lines; three of these closely approximate to the base and also to each other, are very short, and being sharply angled on reaching the sub-costal ray, return to the costa; the next line originates on the inner margin, and proceeds two-thirds of the way towards the costa; it then suddenly returns to the inner margin, enclosing a finger-shaped area, the inner half of which is dark, the outer half pale; a very conspicuous black discoidal spot is placed near the finger-shaped mark, and there is also, in some specimens, an extremely fine line running from its summit to the costal margin; next follow four oblique umber-brown lines, the first, second, and third of which are bent at the sub-costal ray, the fourth is continued to the costa without bending; there is a conspicuous umber-brown cloud between the discoidal spot and the tip of the wing, and the four oblique umber-brown lines pass through this cloud; a white line follows the fourth of these dark lines, and then a transverse series of dots, all of them seated on the wing-rays; these are very indistinct; lastly, there is a white line parallel with the hind margin, and rather undulating: the hind wings are of the same colour as the fore wings, with eight transverse dark lines parallel with the hind margin; there is a very distinct dark line on the margin itself in all the wings: the head, thorax, and body are variegated with the two shades of brown.

The MOTH appears on the wing in June. It has occurred in several English counties, both north and south, and has been taken in Scotland; it is also reported by Mr. Birchall as

taken by Mr. Bristow in the county Wicklow. (The scientific name is *Phibalapteryx lignata.*)



343. The Many-lined (*Phibalapteryx conjunctaria*).

343. THE MANY-LINED.—The antennæ appear slightly thicker in the male; the fore wings are very pale wainscot-brown, with numerous transverse darker lines; two of these, near the middle of the wing, enclose an area which is darker round the margins, and especially near the inner margin, and paler in the middle; the pale part including a small but very distinct discoidal spot; exterior to this median enclosure, a very oblique dark band crosses the wing from the extreme tip to the inner margin, and the costa itself is of the same colour, but interrupted by five or six pale spots; in addition to these principal markings there are several transverse dark lines: the hind wings are pale wainscot-brown, with six or seven transverse darker lines which originate on the inner margin, and terminate rather beyond the middle of the wing: the head, thorax, and body are pale wainscot-brown, the body having two black spots placed transversely on each segment.

The MOTH appears twice in the year, in March and September; it has been taken in damp meadows near Bristol and Cambridge, but is extremely local. I am not aware of its having been taken in the north of England, in Scotland, or in Ireland. (The scientific name is *Phibalapteryx conjunctaria.*)

Obs.—This moth is the *Phibalapteryx polygrammata* of Doubleday's List, and Mr. Doubleday himself informs me that it is certainly the *Phibalapteryx conjunctaria* of Lederer, who has sent him a specimen of the true *Phibalapteryx polygrammata* of Borkhausen, which is very different in general appearance from our English insect described above. Guenée appears to think that the two insects are not specifically distinct, and makes *conjunctaria* a variety of *polygrammata*, a view of the case which Mr. Doubleday adopted in his Catalogue of 1866.



344. The Small Waved Umber (*Phibalapteryx vitalbata*).

344. THE SMALL WAVED UMBER.—The antennæ are almost simple in the male, but appear somewhat stouter than those of the female; the fore wings are long and rather pointed, of a pale wainscot-brown colour, with a broad oblique smoke-coloured shade, which, commencing below the tip of the wing, terminates near the middle of its inner margin, and includes several waved umber-brown lines: there is a small but very black discoidal spot, and between the oblique shade and the hind margin are two waved umber-brown lines: the hind wings are dingy grayish-brown, with numerous waved transverse darker lines: the head is dark brown; the thorax pale, with two transverse dark brown belts; the body dark brown, with paler belts.

The EGGS are laid during the summer months, July and August, on the common honesty or traveller's joy (*Clematis vitalba*), and the CATERPILLAR feeds, as far as my observations extend, exclusively on this plant.

It appears to be full-fed in October, and then rests in a very rigid, straight, and stick-like position, attached by its claspers, and sometimes also by its feet, often thus forming a bridge between two leaves or petioles; the head is equal in width to the second segment, flat, generally porrected on the same plane as the body, but when the caterpillar is annoyed, it is bent down into a prone position; the antennal papillæ are very conspicuous and slightly divergent: the body is cylindrical, but has a lateral skinfold, and is wrinkled transversely, the wrinkles being more manifest towards either extremity; the head and body have many small scattered warts, and

each wart emits a rather stiff bristle; the colour of the head is gray, with a median brown stripe, which dilates at the mouth, where it terminates in two black spots: the gray cheeks are adorned with a double series of short narrow black lines: the body is grayish umber-brown, paler and almost pure gray towards the anal extremity; there is a medio-dorsal, narrow, and almost black stripe extending from the head (where it meets the dark median stripe of the head) to the anal flap; this is interrupted at the interstices of the segments, and indistinct in the middle of the body, but strongly pronounced at both extremities; the skinfold is pale, the pale colour much interrupted and broken into spots, but extending on each side into the anal claspers, where it is very conspicuous, and bordered on each side with dark brown, approaching to black: the ventral area is dark brown, with a medio-ventral dark stripe, intersected throughout by a narrow light stripe, which is sometimes entire, sometimes broken into shuttle-shaped divisions: legs and ventral claspers concolorous with the body.

The MOTH appears on the wing in June and again in August: it seems to be confined very much to the southern and eastern English counties, and has not been observed in the north of England, in Scotland, or in Ireland. (The scientific name is *Phibalapteryx vitalbata.*)

Obs.—Several specimens of this strikingly-marked moth, among many others, have been sent me to name, a circumstance that leads me to say that I am at all times willing to name insects sent to me with this object, but that I can neither undertake to repack and return the boxes, nor to write a letter about each of such consignments. I do not make this announcement from any disinclination to the task, but because it is impossible to do so and simultaneously proceed with this "Natural History of British Moths;" I have not time for both occupations. If, therefore, my readers continue to apply for names, they must seek the replies in the "Entomologist," which is published on the first of every month, and is devoted entirely to the diffusion of information about insects. It may be had of Simpkin, Marshall, & Co., or any other London bookseller, and has long been the means of introducing to each other those entomologists who desire to improve their collections by exchange of specimens. It must be obvious that such matters cannot with propriety be introduced into a systematic work such as this "Natural History of British Moths." Should any entomologist wish to retain the specimens sent for names, they may be had on personal application at this office, between the hours of ten and four, *No.* 9, *Devonshire Street, Bishopsgate Street.*



345. The Tissue (*Scotosia dubitata*).

345. THE TISSUE.—The antennæ are simple in both sexes; all the wings are broad and ample, the hind margin of the fore wings slightly scalloped, that of the hind wings deeply so: the fore wings are very glossy, and of an umber-brown colour, with a very beautiful tint or reflection of rosy-red; this rosy gloss, seeming to overlie the rich brown, gives the recently-disclosed insect a remarkably beautiful appearance; moreover, there are transverse lines and bars traversing every part of the wing; some of these are darker, some lighter than the ground colour, and all of them are waved and irregular; some of these transverse markings combine to form a broad but rather indefinite median band, which is darker at both margins and lighter in the middle; the outer margin of this band has two sharp teeth or angles projecting towards the hind margin; the upper of these is very acute, the lower obtuse; on each side of the median band is a paler bar intersected by a slender rivulet line; the parallel wing rays extending towards the hind margin are spotted with dark brown and whitish-gray, and there is a slender and indistinct sinuous pale gray line parallel to the hind

margin and expanding into a pale gray blotch near the anal angle; the margin itself has a slender but very distinct dark brown line following its sinuosities: the hind wings are dingy brown, with about six transverse, waved whitish lines: the head and thorax have the same colour as the fore wings; the body the same colour as the hind wings, each segment having a gray margin and an indication of two dark spots placed transversely.

Mr. Crewe thus describes the CATERPILLAR: The ground colour is pale yellowish green, with two whitish yellow central dorsal stripes; there are two sub-dorsal stripes also whitish yellow; the spiracular stripe is bright yellow and orange; the back and sides are occasionally studded with a few black tubercles, and always with a few short whitish hairs; the belly is destitute of markings. It feeds on the common buckthorn (*Rhamnus catharticus*), and is full-fed about the middle of June, when it forms an earthen cocoon, and therein changes to a dark reddish brown CHRYSALIS.

The MOTH appears on the wing in August, and the impregnated females hybernate and deposit their EGGS in the spring, the males being destroyed by the early frosts at the approach of winter. It occurs in most of the English counties, and is reported from Scotland and Ireland. (The scientific name is *Scotosia dubitata*.)



346. The Brown Scallop (*Scotosia vetulata*).

346. THE BROWN SCALLOP.—The antennæ are simple in both sexes; the hind margin of the fore wings is slightly waved, that of the hind wings scalloped; the colour of all the wings is a faded grayish-brown, thickly powdered with excessively minute darker dots, each of which generally consists of a single scale; some of these dots are so grouped as to form very indistinct, waved, transverse lines, which are more distinct and spot-like on the costal margin, but become obscure and difficult to trace on the disk of the wing; there are also two slender transverse whitish lines, which seem designed to mark the limits of a median band, the band itself being obsolete; between these lines is an obscure roundish discoidal spot; on all the wing-rays of both fore and hind wings are pale spots or dots: the head, thorax, and body, are of the same colour as the wings; the body of the male has a large trifid tuft at the extremity.

The CATERPILLAR, as described by Mr. Crewe, is short and stout, and in form much resembles that of the winter moth; the back and a central dorsal stripe are black, the latter bordered with white; the sides are yellow; the spiracular line is black, broken, and unconnected; the spiracles are black; the head is black; the collar yellow, with a transverse blackish dotted line. It feeds on the common buckthorn (*Rhamnus catharticus*), residing between two leaves which it spins together; it eats the outer cuticle of the leaf, leaving the membrane bare, and is full-fed the first week in June, when it descends to the ground and spins an earthen cocoon, in which it changes to a long and slender CHRYSALIS, the body of which is tapering and bright red, the divisions being dark red; the wing cases are paler, and semi-transparent.

The MOTH appears on the wing at the end of June, and is not uncommon in the southern counties of England; but has not been reported from Scotland or Ireland. (The scientific name is *Scotosia vetulata*.)

Obs.—Haworth invites especial attention to the trifid tuft which terminates the body of the male; there are perhaps some indications of this character in other cognate Geometers, but in this species alone is it developed in such an extraordinary manner.



347. The Dark Umber (*Scotosia rhamnata*).

347. THE DARK UMBER.—The antennæ are simple in both sexes; the wings are ample; the hind margin of the fore wings is waved; that of the hind wings scalloped; the colour of the fore wings is deep sienna-brown, with an oblique median band of smoky umber-brown; the margins of this band are bordered by a slender white line, and are very irregular, the interior margin having an acute double notch or indentation; the exterior margin has an acute double angle or tooth in a corresponding position; an oblique shade proceeding from the tip of the wing meets this projecting angle, and at the first glance seems continuous with it, but is not so; within the oblique band over the double notch, which I have described, is a longish black discoidal spot; there is a slender sinuous gray line accompanied by a dark line of similar character parallel to the hind margin, and the hind margin itself has a distinct and continuous slender line almost black, following its sinuosities: the hind wings are of nearly the same colour as the fore wings, the median band being absent, but in its place is a very distinct slender line almost black, and there is a similar line on the hind margin: the head, thorax, and body have the same colour as the wings; the body has a blackish margin to each segment, and that of the male is tufted at the extremity.

Mr. Crewe describes the CATERPILLAR as having the ground colour of a bright vivid green; the medio-dorsal stripe is bright green, the respiration being very apparent beneath it; the sub-dorsal stripes are very slender and indistinct, and of a yellowish colour; the segmental divisions are deep yellow; the spiracular stripe pale yellow and slender; on each side of the three posterior segments below the spiracles is a broad purple stripe; the anal flap, tip and claspers are deep purple, the belly is traversed longitudinally by three whitish stripes, the central one broader than the others, and bordered with small yellowish spots. It feeds on the common buckthorn (*Rhamnus catharticus*), and is full-fed the first week in June, when it descends to the earth, and forming an earthen cocoon, changes therein to a dark reddish-brown CHRYSALIS.

The MOTH appears on the wing in August, and occurs chiefly in the southern and eastern counties of England, but has been reported as far north as York. I have not heard of its occurrence in Scotland or Ireland. (The scientific name is *Scotosia rhamnata*).



348. The Scarce Tissue (*Scotosia certata*).

348. THE SCARCE TISSUE.—The antennæ are simple in both sexes; the hind margin of the fore wings is waved, that of the hind wings scalloped; the colour of all the wings is grayish-brown, with a slight tint of sienna-brown; there are several compound bars composed of dark lines on the fore wings, but nothing like a distinct median band; there is a conspicuous discoidal spot adjoining one of these darker lines, and there is also a zigzag gray line parallel to the hind margin; this dilates into a small gray blotch at the anal angle of the wing; there is a slender dark line on the hind margin of all

the wings following their sinuous outline, but interrupted by a pale gray spot on each wing-ray as it passes through this marginal line: the head, thorax, and body are of the same colour as the wings; the basal segment of the body has a black belt interrupted in the middle, and two black dots placed transversely on each of the following segments.

The CATERPILLAR feeds on the leaves of the common barberry (*Berberis vulgaris*), a plant formerly abundant in our eastern counties, but now in the process of extermination, under the insane idea that it produces blight in wheat. My kind friend Mr. W. R. Jeffery, of Saffron Walden, has sent me a dozen of these caterpillars, greatly varying in size; when young, they spin together two leaves of the barberry, adjusting the edges with so much care that the two leaves look like one; the back of the upper leaf I always find applied to the face of the lower; and between these leaves the enclosed caterpillar rests in a curved posture, the head brought round to touch the side of the tenth segment, but the caterpillar always resting on its ventral surface, and not ring-fashion: in this retreat it eats the cuticle and parenchyma of the upper leaf, its operations betraying its whereabouts by the appearance of a large brown blotch on the surface.

The full-fed caterpillar is obese and somewhat depressed; the head glabrous, narrower than the body, which is of nearly uniform substance throughout, and furnished, on the sides especially, with minute scattered bristles: there are no excrescences. The colour of the head is wainscot-brown, with a few black dots; the body has the dorsal area dull lead-colour, bordered with a blackish stripe on each side; beneath this is a series of orange spots, and in the middle of each spot a black spiracle; the ventral surface is pale smoke-colour, with two darker blotches on each side of each segment, the upper of which is small and roundish, the lower larger and longer; intermediate between the lead-coloured dorsal area and its marginal dark stripe, is a series of white dots; the legs are dark; the claspers concolorous with the ventral surface. The caterpillars are full-fed about the beginning of July.

The MOTH appears on the wing in May and June, in which months I have found it not unfrequently on park palings on Blackheath; it has also been taken in Essex, Cambridgeshire, and Gloucestershire, but I have not heard of it from Scotland or Ireland. (The scientific name is *Scotosia certata.*)



349. The Scallop Shell (*Eucosmia undulata*).

349. THE SCALLOP SHELL.—The antennæ are simple in both sexes; the fore wings are broad and ample, the tips rather pointed, the hind margin is almost straight, that of the hind wings scalloped; the inner margin of the hind wings is dilated near the middle, and beneath the dilatation, and partially protected by it, there is, in the male only, a beautiful tuft of long scales, which project beyond the dilated margin, and form a conspicuous object even when the insect is viewed from above. The ground colour of the wing is grayish-brown, transversely traversed by fourteen zigzag black lines, the crenations of which, as far as the ninth, which includes the discoidal spot, are directed towards the hind margin, the remainder towards the base of the wing, thus frequently producing a chain-like ornamentation towards the middle of the wing; the hind margin is sienna-brown, intersected throughout by a zigzag white line: the hind wings are rather paler than the fore wings, with four distinct, and two (nearer the base) indistinct black zigzag lines; the hind margin is sienna-brown, intersected throughout by a zigzag white line; the fringe is alternately pale and dark: the tuft on the hind wings of the male is black; the head, thorax, and body are gray-brown; there are two darker spots

placed transversely on the thorax, and two on each segment of the body. The under side is remarkable for the presence of a very conspicuous discoidal spot on each wing, these spots not being traced without difficulty on the upper side.

Mr. Beauchamp has favoured me with the following life-history of this species :—"I took a female in 1861. She laid me some small oval whitish EGGS on the under side of a sallow-leaf, generally in the hollow by the side of the mid-rib or some other rib, often two or more on a leaf, but never adjoining each other. I transferred them to a young tree growing in a pot. As soon as hatched, the CATERPILLARS spun a web resembling that of the *Yponomeutidæ*, and sometimes, like them, several together. When a little older, they bent and fastened leaves together, and ate through the walls of their dwelling until they left only a skeleton, when they went on to another place, to behave in a similar manner. They were very sluggish, not taking the trouble to push their tails outside, so that when they had eaten the walls of their tent, the lower part formed a bag full of their excrement. They usually lay curled up in their tent, and all mine continued to dwell under cover until they went down. I think I never saw them outside, except when they were removing, and once when they had eaten their plant down to the stump; then they crawled about uneasily until fresh food was introduced. When full-grown they were scarcely an inch long, and reminded me somewhat of the caterpillars of *Eupithecia venosata* in their general appearance. I proceed to give a description of them. Short and stumpy, with a few very short hairs; head small, shining brown, the two upper lobes round and conspicuous; dorsal line brown, bordered on the upper side by a slender broken whitish line (perhaps this is the true sub-dorsal); spiracular line broad, dirty white, puckered; the ground colour above the spiracular line varies from pale flesh-colour to dark brown; the belly from pale gray to dark gray; in the dark specimens the dorsal line is scarcely perceptible, but the sub-dorsal (?) is perceptibly darker. On the upper side of each of the anal claspers there is a large blackish spot, in addition to which, light specimens have a blackish spot on the centre-piece of the anal segment. The chrysalis is in a rather slight earthy cocoon. I kept mine in a fireless attic."

Mr. Beauchamp's MOTHS began to emerge early in May, and the last made its appearance about the end of that month: he took great pains to continue the breed, but ineffectually, although he sacrificed a dozen specimens for that purpose, keeping them till they died, in a large leno bag over a growing tree, and feeding them with syrup; some of them lived more than a fortnight, but only a score of eggs were laid, and all of them proved infertile.

The MOTHS usually appear on the wing in June, notwithstanding Mr. Beauchamp's brood appeared early in May. They have been taken in many parts of England, particularly in the southern counties, but I do not know of the species having occurred in Scotland; but Mr. Birchall has taken it at Powerscourt, in Ireland. (The scientific name is *Eucosmia undulata*.)



350. The Red-green Carpet (*Cidaria psittacata*).

350. THE RED-GREEN CARPET.—The antennæ are slightly pubescent in the male, just sufficiently so to make them appear more robust than those of the female; the fore wings are rather narrow, and the tip rather pointed; the colour of the fore wings is a rich greenish gray, with two paler transverse bars: the first of these is situated before the middle of the wing; it commences on the costal margin, and is contracted before the middle; it then expands, then again contracts below the middle, and lastly, expands to its greatest width on the inner margin: the second bar is

beyond the middle of the wing; it is frequently interrupted in the middle, or broken into two pale blotches, one on the costal, the other on the inner margin; each of these blotches is intersected by a slender darker line, and they are connected by a slender paler line, sometimes scarcely perceptible, but always sufficiently so to indicate the direction of the bar, even when its centre is suffused with dark gray-green; the blotch on the costal margin is the paler of the two, that on the inner margin is rufous in the middle, white on the sides; near the middle of the wing is a very obscure discoidal spot; the hind wings are dark gray-brown, with a transverse waved whitish line parallel with the hind margin; they have also an indistinct linear discoidal spot; the head and thorax are of the same colour as the fore wings; the body of the same colour as the hind wings.

The CATERPILLARS are very rarely met with, and we are without much information respecting them; they are almost uniformly cylindrical, and the anal segment terminates in two acute points directed backwards; in colour they are very variable, some of them being yellowish green as regards the dorsal, olive-green as regards the ventral area; others have the green dorsal area relieved by a medio-dorsal series of bright red blotches, and the anal points are also red; others, again, have a pink medio-ventral stripe and pink legs. In 1863, Mr. Hellins beat four of these caterpillars from oak, two of them, very small, on the 15th of June, and two larger ones on the 10th of July; July and August are probably the right months to find the caterpillar full-fed.

The MOTH does not appear until October and November, and may then be occasionally found on the blossoms of ivy and *Laurustinus*. It occurs in most of the southern counties of England, also in Durham, the Lake District, Yorkshire, and Scotland, and Mr. Birchall informs us it is common at ivy-bloom in the county of Wicklow, in Ireland. The impregnated female hybernates. (The scientific name is *Cidaria psittacata.*)



351. The Autumn Green Carpet (*Cidaria miata*).

351. THE AUTUMN GREEN CARPET.—The palpi are rather long and porrected, the antennæ are simple in both sexes; the fore wings are blunt at the tip, and of a pale green colour, with two pale or gray-green bars, the first before the middle of the wing, the second beyond it; the green ground colour is thus divided into a basal blotch, a median band, and a hind-marginal band; and this last is intersected by a transverse zigzag white line; the green parts include a number of waved and interrupted black lines, and a discoidal spot is indistinctly visible in the median band; on the hind margin itself is a series of jet-black dots arranged in pairs, and between them and the white line already described, are six, and sometimes a seventh, jet-black streaks; the hind wings are gray, with a discoidal spot; the head and thorax are green, the body gray-green.

The CATERPILLAR of this species has been found by Mr. Machin in August, feeding on alder, oak, and birch; it is green, with two points projecting from the anal segment. This very slender information is recorded in Mr. Stainton's Manual. The caterpillar was unknown to Guenée.

The MOTH appears on the wing in October, and frequents the blossoms of ivy; like some other species of geometer, the impregnated female hybernates, and deposits her EGGS in the following spring; it is very commonly found in sheds, outhouses, and other buildings, during the winter, but the male has not been seen in such situations, and it is presumed that he perishes with the early frosts. This moth occurs in many English counties, both northern and southern, also in Scotland, and in the county of Wicklow and at Howth, in Ireland. (The scientific name is *Cidaria miata.*)



352. The Short-cloak Carpet (*Cidaria picata*).

352. THE SHORT-CLOAK CARPET.—The palpi are short, and the antennæ simple in both sexes; the fore wings are dark olive-green, from the base to beyond the middle, and this dark area is followed by a white band into the middle of which the dark area projects a double angle; the hind margin is olive-green interrupted with white lunules, and a white blotch near the tip: the hind wings are smoky-gray, with transverse whitish markings: the head and thorax are nearly of the same colour as the fore wings.

An anonymous writer in the *Entomologist's Weekly Intelligencer*, informs us that the ground colour of the CATERPILLAR is a pale stone-colour, with the segmental divisions reddish; there is no dorsal line, but a dark blackish patch, on each segment, increasing in size and depth of tint up to the ninth, where it attains its maximum; there are none of these patches on the last four segments; the sub-dorsal stripe is dusky, very much freckled and diffused, and forming four small dark dots at the corners of the dorsal patches; just above the spiracles is an irregular dusky stripe, enclosing a thin waved line of the ground colour, bordered with black: the spiracles are black; the belly is marked on each side at the segmental divisions with groups of small black spots. In confinement it will feed on chick-weed, and thrives well.

This MOTH, which appears to belong to the genus *Melanippe* rather than to *Cidaria*, is taken not unfrequently in the south of England in June. I have found it in Darenth and Birch-woods, in Kent, but I have no record of its occurrence in the north of England, in Scotland, or in Ireland. (The scientific name is *Cidaria picata*.)

353. THE HAZEL CARPET.—The palpi are pointed, porrected, and rather long; the antennæ are simple in both sexes; the fore wings are blunt at the tip; they have an olive-brown blotch at the base, and an olive-brown median band, the margins of which are much angled and very irregular; both the blotch and the band are bordered with a pure white line; between the blotch and the band is an angulated pale brown bar, and beyond the band is another bar of the same colour, beyond which is a zigzag white line, and again, beyond this are several white crescents almost on the hind margin; the median band is very frequently interrupted in the middle, the discoidal spot being in the upper division; the hind wings are gray, with a transverse median white line and a discoidal spot in the basal area; the head and thorax have the same colour as the fore wings, the body the same colour as the hind wings.

There are two so-called species of this moth united under the name *corylata*. They are now generally considered varieties.



Var. 1. The Broken-barred Carpet (*Cidaria corylata*).—The fore wings have a very distinct basal blotch and median band.



Var. 2. The White-blotched Carpet (*Cidaria albo-crenata*).—The fore wings are marked very confusedly with white.

An anonymous but perfectly trustworthy writer in the *Entomologist's Weekly Intelligencer* writes thus respecting the CATERPILLAR of this species:—"Two or three caterpillars,

hatched on the 22nd of June, fed upon the small-leafed sloe, and went to earth on the 2nd of October, having grown so very slowly that for a long time I fancied—especially as they did not appear at all unhealthy—that they would hybernate. They had the ground colour of a yellowish green, and the sub-dorsal stripe greenish yellow; on the third to the fifth segment, and again on the eleventh to the tail, there is a dark reddish brown dorsal stripe; on each of the intermediate segments are four very fine brown dots arranged in pairs, with a fine dash on each segment, and at each segmental division; the spiracles are white, the middle ones having between them a row of four brown spots; the belly is sprinkled with very fine brown dots, arranged in lines." Mr. Hellins, in the *Zoologist* for 1864, adds to this information that this is the only British species of *Cidaria* that has the head bifid; it is singular also in having but *one* anal point.

The MOTH appears on the wing in June, and seems to be abundant in most parts of England, Scotland, and Ireland. (The scientific name is *Cidaria corylata*.)



354. The Marsh Carpet (*Cidaria sagittata*).

354. THE MARSH CARPET.—The palpi are very short and scarcely perceptible from above; the antennæ are simple in both sexes; the fore wings are black at the tip, their ground colour is the most delicate isabelline or fawn-colour, with a basal blotch and median band of a rich dark olive-brown, almost black; there is a delicately-white line on both sides of the basal blotch, and also on both sides of the median band, the middle of which emits an elongate and sharp angle towards the middle of the hind margin, which it almost reaches, but a small and vaguely-defined white blotch intervenes; the discoidal spot is present in the central band, but so nearly of the same colour as the band, that it cannot be distinguished without difficulty; the fringe is pale, with seven dark spots: the hind wings are very pale, with a distinct discoidal spot, a very slender hind-marginal line, and a spotted fringe: the face is black, the crown white, the thorax isabelline, with a central brown blotch; the base of the body has a black band followed by a white belt; the rest of the body is rich brown, with a median dark dot on each segment.

The EGGS are laid in July, in little batches of three or four, on the partial stalks or flowers of the subcorymbose panicle of common meadow-rue (*Thalictrum flavum*), a plant which grows abundantly by the sides of some of the fen-drains near Chatteris, in Cambridgeshire; they are opalescent when laid, but become yellow before the young CATERPILLARS emerge, which emergence generally takes place during the first week in August. The young caterpillars are at first orange-coloured, but soon acquire a more variegated appearance. They feed almost entirely on the seeds of the meadow-rue, but sometimes they also nibble round the partial stalks of the panicle, denuding them of their cuticle, and causing small white patches; and Mr. Fryer, to whom I am indebted for a bountiful supply of these caterpillars, as well as many particulars of their economy, informs me that in confinement they will eat the dried or withered leaves of *Thalictrum glaucum*, or *Thalictrum aquilegifolium*, the latter a species very commonly cultivated in gardens, and remarkable for its abundantly floriferous panicle, so attractive to the beautiful rose-beetle (*Cetonia aurata*), and other insects.

Mr. Fryer has observed that if, when the caterpillars have attained about half their growth, they are supplied with *Thalictrum glaucum*, they will bite half through the foot-stalks of the leaves, thus causing the leaf to droop and wither, and in this state they will feed on it as a substitute for their natural food, the seeds of *Thalictrum flavum*. In their progress towards maturity, the caterpillars undergo considerable change, the ex-

quisite colouring of the full-fed caterpillar being only acquired by slow degrees.

They are full-fed in about a month, and then invariably rest with the back much arched, the head almost entirely withdrawn into the second segment, the feet directed forwards, and the claspers tenaciously adhering to the slender flower-stalks of the food-plant. The head is narrower than the second segment, highly glabrous, the face flattened, the crown slightly notched: the body is obese, deeply incised at the divisions of the segments; the thoracic segments, namely, the second, third, and fourth, are dilated at the sides, and the second segment also in front; the dorsal areas of these three segments unite in forming a shield; the fifth, sixth, seventh, eighth, ninth, and tenth segments have each a transverse dorsal ridge, very prominent and conspicuous, which terminates on each side in a kind of lobe or festoon, containing the spiracle: the ventral area has also gibbous projections, somewhat corresponding with those on the back, but proportionally less, in order to allow of the arched position in which the caterpillar usually rests; scattered over the dorsal area are minute warts, few in number and very inconspicuous in appearance; each of these emits a small bristle. The colour of the head is apple-green, the cheeks being sparingly and inconspicuously sprinkled with black: the body is apple-green; the crest of each dorsal ridge is of a rich velvety oil-green, thus forming a series of conspicuous transverse bands, the interstices being pale apple-green; the lateral lobes or festoons are in some specimens apple-green, but in others of a most beautiful rose-colour, and this again is bordered below by the most intense velvety black; this black border descends into the anal, but not into the ventral claspers; the dorsal area of the tenth and twelfth segments is smoke coloured, fading at the lateral margin into green, and there decorated with blotches of rose-colour; the spiracles are reddish; the ventral area, legs, and claspers are delicate apple-green; the hairs or bristles are black. At the end of August most of these caterpillars spin up amongst the flowers of the food-plant; others descend to the surface of the earth, and there change into short, obese, glabrous CHRYSALIDS, having the head rather projecting and rounded, the thorax very convex, the wing-cases ample, and the anal segment very slender and horn-like, directed backwards, and bearing at its extremity two stout divaricating bristles. The colour of the head, thorax, and wing-cases is transparent olive-green, of the abdomen testaceous brown.

The MOTH appears on the wing in July, and is only known to have occurred in Cambridgeshire, more especially near Chatteris. (The scientific name is *Cidaria sagittata.*)

355. THE COMMON MARBLED CARPET.—The palpi are short, connivent, and form a short beak; the antennæ are nearly simple in both sexes; the fore wings are ample and somewhat pointed at the tip; their colour is very varied; there is a large smoky-brown space at the base, intersected but scarcely interrupted by a sienna-brown bar; the middle area of the wing is whitish-gray, and includes on its whitest part a narrow oblique discoidal spot, and two or more irregular transverse lines, in addition to similar boundary lines, the exterior of which is produced in the middle into a triple blunt lobe; adjoining this lobed black line is a zigzag white line dilated at the costa; this is followed by a sienna-brown bar, and this by a broad hind-marginal smoky-brown band, which is intersected throughout by a zigzag white line and other markings too numerous and too obscure to describe: the hind wings are pale gray-brown: the head and thorax are very much of the same colour as the base of the fore wings; the body is of the same colour as the hind wings.

It seems absolutely necessary in this and some other moths to mention that more than one book species are included under the name: I will call them varieties.

Obs.—Both the English and scientific names of the *varieties* in this and the following species are taken from Haworth; the names of the *species*, which combine and include the varieties, are from Doubleday's List.



Var. 1. The Common Marbled Carpet (*Cidaria Centum-notata*).—The median area of the fore wings is pale gray, almost white.



Var. 2. The Yellow Marbled Carpet (*Cidaria Comma-notata*).—The median area of the fore wings is bright fulvous yellow.



Var. 3. The Brown Marbled Carpet (*Cidaria perfuscata*).—The median area of the fore wings is dark smoky-brown.

This species is uniformly double-brooded.

The EGGS which produce the spring brood are laid about the middle of August; those which produce the autumnal brood are laid about the middle of May; the CATERPILLARS from this second brood hybernate, or rather live through the winter, feeding at intervals when the weather is mild: the egg is flattish or depressed on the crown, and of a dingy yellow colour, "resembling that of a pale-tinted chip-box;" it is laid on the leaves of wild strawberry (*Fragaria vesca*), and also, according to Guenée, on birch and whitethorn, and according to Mr. Hellins, "on sallow:" the young caterpillars emerge about fourteen days after the egg is deposited, and are at first of a dirty white, but soon acquire a green tinge, which continues to increase as they advance towards maturity. When full-fed this caterpillar usually rests in a straight position, but when annoyed or disturbed, tucks in its head, bringing it in close contact with the legs, thus causing the anterior half to assume the volute form. The head is about the same width as the second segment, not notched on the crown, and slightly hairy: the body is almost uniformly cylindrical, but somewhat restricted immediately behind the fourth segment, which is produced ventrally into a lump, on the summit of which are seated the third pair of legs; the thirteenth segment below the anal flap is produced into two parallel "acutely pointed" processes directed backwards; the colour of the head is pale opaque green, with conspicuous black ocelli; the body is pale yellow-green, with a medio-dorsal stripe, narrow and indistinct, of a darker, duller green; there is also on each side a paler stripe, equally indistinct; and in many specimens, below this sub-dorsal stripe, is a lateral, but often interrupted rosy-red or purple stripe: this red stripe is accurately described by Guenée, and Mr. Doubleday assures me it is of common occurrence: the transverse skin-fold at each segmental division is yellowish, and over the entire surface of the body are scattered minute white warts, each of which emits a slender hair, and is surrounded by an area slightly darker than the prevailing ground colour; the anal points are generally tipped with rose-colour, and the legs and claspers are tipped with purple. When full-fed it spins a leaf together with a few slight threads, in the manner of a spider's web, and in this flimsy retreat turns to a delicately-green semi-transparent CHRYSALIS.

The MOTHS appear in May and August, and are common in England, Scotland, and Ireland. (The scientific name is *Cidaria russata*.)

356. THE MARBLED CARPET.—The palpi are short, connivent, and form a short beak; the antennæ are simple, or nearly so, in both sexes; the fore wings are ample and somewhat pointed at the tip; their colour is very varied; there is a gray-brown blotch at the base, which has generally two transverse zigzag black

lines, one median, the other marginal; this is followed by a sienna-brown bar, bordered on both sides by a delicate white line; next follows a broad median bar, which is generally pale gray in the middle, and darker towards each margin; it includes a narrow oblique discoidal spot and four zigzag black lines, the exterior of which is produced in the middle into a bifid angle or lobe; this black boundary line of the median band or area is followed by a zigzag white line, which widens into an oblique white blotch on the costa, and is immediately followed by a sienna-brown zigzag bar, and this again by a zigzag white line; the hind margin of the wing is a mixture of gray and smoky-brown: the hind wings are pale grayish brown: the head and thorax are of the same colour as the fore wings: the body of the same colour as the hind wings.

This moth has been made into two book species, which I will call varieties.



Var. 1. The Dark Marbled Carpet (*Cidaria immanata*).—The median area of the fore wings is very dark brown, almost black.



Var. 2. The Marbled Carpet (*Cidaria marmorata*).—The median area of the fore wings is pale whitish gray.

This species is uniformly single-brooded: the EGGS are laid in August, on the leaves of wild strawberry (*Fragaria vesca*); they are rather flat, and of a primrose-yellow colour, in some instances with a reddish tinge; the young CATERPILLARS emerge towards the end of March of the following year, and are then yellow, but after the first month acquire a green tint, and the colour continues to change as the spring advances, until the end of May or beginning of June, when they are full-fed, and then are almost precisely of the same colour as the leaf on which they are feeding; when young they drill small circular holes in the strawberry leaf, but when older feed in the usual manner at the edges.

The position in which the adult caterpillar rests is usually perfectly straight, but on being annoyed it raises the anterior part of its body and tucks in its head, which is brought into contact with the legs, and the whole crowded together: if the annoyance is continued, the anterior part of the body is curled into a compact volute. The head is about the same width as the second segment, is not notched on the crown, and is slightly hairy; the body is almost uniformly cylindrical, but somewhat restricted immediately behind the fourth segment, which is produced ventrally into a lump, on the summit of which are seated the third pair of legs: the thirteenth segment below the anal flap is produced into two parallel "bluntly" pointed processes directed backwards. The colour of the head is uniform dingy green, the ocelli black and conspicuous: the body is apple-green, with narrow inconspicuous stripes of a darker hue; the principal of these is medio-dorsal; the others in the region of the spiracles are extremely difficult to distinguish, and have a median, hair-like, whitish line; a transverse skinfold at each segmental division is yellow: the body is beset with minute white warts, each of which emits a slender white hair, and is surrounded by a green space rather darker than the rest of the body; the tips of the anal processes are rosy; the legs and claspers are green, tinged at the extremities with purple.

When full-fed the caterpillar either goes down into the moss usually kept in the breeding-cage, or selects a dried leaf, fastening the moss or the edges of the leaf together with a few silken threads; within this flimsy retreat it changes to a smooth, green, semi-transparent CHRYSALIS.

The MOTH appears on the wing in July, and occurs in England, Scotland, and Ireland. (The scientific name is *Cidaria immanata.*)

Obs.—Mr. Hellins, whose observations have at different times thrown so much light on the life-history of our native *Lepidoptera*, has turned his attention to the difficult task of distinguishing between this closely allied pair of species. His first paper, treating of the perfect insects, is published in the *Zoologist;* his second paper, treating of the preparatory states, appears in the *Entomologist's Monthly Magazine.*

I have freely availed myself of both these papers, and still more freely of my friend Mr. Doubleday's assistance, to whom Mr. Hellins fully acknowledges his obligation for much of the information he has given to the public. From these sources, far more than from my own observations, the following summary results. *First*—The time of appearance in the perfect state differs: *C. russata* appears in May, and again in August, the May moths being the parents of the August moths. *C. immanata* appears in July: thus the single brood of *C. immanata* is intermediate between the two broods of *C. russata*. *C. russata* certainly hybernates in the caterpillar state, but *C. immanata* passes the winter in the egg state. *Secondly*—The habit of the moths differs: *C. russata* has the habit of a true Geometer, when at rest with its wings deflexed; *C. immanata* rather resembles a Deltoid: and this difference arises from a difference in structure, the fore wings of *C. immanata* being slightly narrower and perhaps also slightly more pointed. *Thirdly*—The colour and markings: both species vary greatly in colour, especially as regards the disk of the fore wings, the extremes being dark smoky, almost black, and pale cinereous, almost white; but *C. russata* has a very common variety in which the disk is fulvous: *C. immanata* has no such variety. Again, *C. immanata* has the two narrow, waved, and angulated, transverse, sienna-brown bars on the fore wings, much more distinct than *C. russata*. Moreover, there is a difference in the exterior outline of the broad central band of the fore wings: "In both species this commences at the costa, at about two-thirds of the distance between the base and the tip, and runs across the wing for a little space with very small teeth, then shoots out into a large bilobed (sometimes, in *C. russata*, trilobed) tooth, which is followed by another not quite half as large; and, lastly, slants away to the inner margin, forming three more teeth not much differing in size; but the distinction is this, that in *C. immanata* these teeth, especially the largest of them, are more prominent and acute; in *C. russata* they are not so prominent and often rounded." *Fourthly*—The caterpillar of *C. russata* is dull ochreous at first, but afterwards brightish green, and often ornamented with red on the sides. The caterpillar of *C. immanata* is bright yellow at first, but afterwards dull green, and never ornamented with red on the sides. Mr. Hellins also says that the anal points are acute in *C. russata*, obtuse in *C. immanata*. I have described both caterpillars from nature without observing this, but have added these words in inverted commas, as quoted from Mr Hellins.

557. THE WATER CARPET.—The palpi are very short, never visible from above as more than two minute points projecting between the eyes; the antennæ are simple in both sexes; the fore wings are ample and rather pointed at the tip; their colour is brown of two shades; the dark shade is confined to a basal blotch, a broad median band, a costal blotch near the tip, and a vague hind-marginal band; the basal blotch and median band have white marginal lines; the band includes a narrow transverse discoidal spot, and the hind-marginal band includes a transverse series of white spots. An oblique elbowed white line runs from the extreme tip through the hind-marginal band, towards the middle of the wing: the hind wings are brownish-gray, and all the wings have a marginal series of black spots: the head, thorax, and body are dark brown.

Two book species are here included which I call varieties.



Var. 1. The Water Carpet (*Cidaria suffumata*).—The fore wings are very glossy, and distinctly varied with two shades of brown.



Var. 2. The Pitchy Carpet (*Cidaria piceata*).—The fore wings are very glossy, and of a uniform pitchy-brown, with a hind-marginal series of white spots.

The CATERPILLAR, when full-grown, rests in nearly a straight position, its feet as well as claspers holding the food-plant; the head generally porrected and elevated. When disturbed, it raises the fore part of its body, and tucks in its head. The head is rather small; the body has a rough or wrinkled skin, and both head and body emit short scattered bristles, each bristle emanating from a scarcely perceptible wart. All the segments are centrally swollen, especially below, but without dorsal humps. The colour of the head is pale brown, freckled with black; the colour of the body is brown of various shades; the dorsal is decidedly darker than the ventral area, and separated by a clear line of demarcation. The tenth, eleventh, twelfth, and thirteenth segments have the same pale hue above and below; the second, third, and fourth segments are marked by a median whitish dorsal stripe; the fifth, sixth, seventh, eighth, and ninth with a dark V-shaped mark, pointing towards the head, and its arms extending on each side as far as the spiracles. Each V-shaped mark contains a median dark mark, somewhat shaped like an arrow-head, and bordered with a pale margin. The belly is traversed by gray, waved, interrupted, and not clearly-defined stripes, extending throughout its entire length. The spiracles are intensely black. It feeds on the great hedge bed-straw (*Galium mollugo*), and spins among the leaves of its food-plant towards the middle of June.

The MOTH appears on the wing in April, and occurs very commonly in England and Ireland. (The scientific name is *Cidaria suffumata.*)



358. The Netted Carpet (*Cidaria reticulata*).

358. THE NETTED CARPET.—The fore wings are deep chocolate-brown, with numerous creamy-white markings. All the wing-rays are white, with the exception of a portion of three or four of them, where they cross a brown blotch near the middle of the wing, and assume the same colour; the rays, therefore, appear as white lines, and are connected at the distal extremity by a hind-marginal line of the same pale colour, and are intersected by white bands; the first of them is narrow and obscure, and situated near the base of the wing; the second is broad and semi-double, and projects a very conspicuous angle below its middle, and directed towards the hind margin; the next is narrow; it commences on the costa, and curves to meet the double band already described; the next also originates on the costa, and curving in a contrary direction to the last, unites with the broad semi-double bar near the inner margin. The next, being the fifth, is broader; it descends straight from the costa half-way across the wing, and then becomes scalloped, and curves towards the inner margin, near the anal angle. The sixth is double at its commencement, enclosing a small triangular area at the tip of the wing; it is oblique at its commencement, and becomes scalloped at about half its length, and terminates near the anal angle. These various markings give to

the fore wings a remarkably beautiful and tesselated character. I fail to discover a discoidal spot. The hind wings are dingy brown, with two transverse whitish lines, the first slightly waved, the second scalloped.

The MOTH appears on the wing in July, and has been taken, but not frequently, in the lake districts of England. It is not reported from Scotland or Ireland. (The scientific name is *Cidaria reticulata.*)



359. The Small Phœnix Moth (*Cidaria silaceata*).

359. THE SMALL PHŒNIX MOTH.—The palpi are short and very sharp-pointed; the antennæ are nearly simple in both sexes; the fore wings are scarcely pointed at the tip; their colour is brown of two shades, intersected and divided by very pale lines; the dark brown is comprised in a basal blotch, a median band, a transverse series of conical spots, and three or four hind-marginal blotches, the uppermost of which is the largest; the hind wings are pale gray-brown; the head, body, and legs are brown. The size, form, and direction of the markings are so various as to require a series of figures. I am indebted to Mr. Doubleday and Mr. Bond for the loan of the remarkable varieties figured.

The CATERPILLAR, when full-grown, generally rests in a straight position, except that the feet are occasionally attached to the stem of the food-plant, and then the anterior part of the body—that is, the head, together with the second, third, and fourth segments—bent at a right angle with the remainder of the body, the third pair of legs forming the apex of the angle; when disturbed, the legs are detached from the food, and the body bends and oscillates backwards and forwards as long as the disturbance continues. The head, after the manner of many other Geometers, is flattened and porrected, and of equal diameter with the body: the body is long, slender, uniformly cylindrical, without tubercles, having distributed very sparingly over its surface short scattered hairs, which are very slender and inconspicuous, except under a lens. The colour of the head is pale whitish green, the face variously marked with clear brown, which colour is sometimes confined to the sides, sometimes pervades nearly the whole face; the body is delicately green, with a median series of brown dots, one of which is seated on the skin-fold, between the segments; the belly has a median and narrow but conspicuous white stripe; the first and second pair of legs whitish green, delicately tinged with brown; the third pair is brown, the colour continued on the belly to a length about equal to that of the legs themselves; the ventral claspers are pale green, with an exterior tinge of brown; the anal claspers have a double lateral oblique stripe pointing towards the back; the anterior half of this stripe is white, the posterior half purple-brown. I found this caterpillar in a garden at Leominster, feeding on enchanter's night-shade (*Circœa lutetiana*),

and Mr. Thomas Huckett has found others feeding on willow-herb, all of which were full-fed on the 20th of September, when they spun a small cocoon, of very loose structure and somewhat resembling network, against the side of the gallipot in which they were kept, and to this they attached a portion of the food-plant, and in this receptacle changed into CHRYSALIDS.

The MOTH appears on the wing in May, and a second brood in August, and is regarded as common in England, Scotland, and Ireland. (The scientific name is *Cidaria silaceata.*)



360. The Phœnix (*Cidaria ribesiaria*).

360. THE PHŒNIX.—The fore wings are of a rich chocolate-brown colour, interrupted by two compound transverse bars, the first of which is beyond the middle of the wing, the second is almost on the hind margin; the first bar is bordered on both sides with white, the interior border being concave and broadly scalloped, the exterior border having two sharp angles projecting into the rich brown ground colour; between these boundary lines there is a third and faint whitish line which follows the bendings of the outer one; the second bar originates on the costa, almost at the tip, where it is very broad; it is then narrowed and bent inwards, and then again widened and bent outwards to the hind margin; the second bar is bordered by white; on the interior side it descends straight from the costa to the middle of the wing; it is then scalloped and descends to the anal angle; the exterior border is whitish, but not so white as the interior, and the interspace between these two white borders contains seven or eight black markings, all of them bordered with white; they are set, as it were, in white frames; the first, second, and third of these are triangular, the fourth linear, the remainder crescent-shaped; the hind wings are brownish-gray at the base, and paler towards the hind margin, the paler portion being intersected by two faint zigzag lines, each of which is darker towards the base, paler towards the hind margin; the head, thorax, and body are brown; the segments of the body edged with gray, and having two spots placed transversely on each.

The EGGS are laid in July on the bark of currant and gooseberry-bushes, but do not hatch until the following spring; they are shaped much like a powder-flask, with three ridges at the smaller end and a depression on the side. The CATERPILLAR feeds on the leaves and is full-fed in June. The head is rather small, porrected, but not distinctly exserted; the second segment is small and narrow, the third is swollen all round; the remainder of the body uniformly cylindrical. There are two very distinct varieties as regards colour: in the more common variety the colour of the head is sepia-brown, variously shaded and spotted with darker tints of the same; the body is dingy brown; the third segment has a transverse elevated black band, which contains eight white dots; the fourth segment has a conspicuous black dot on each side; on every segment, from the fourth to the eleventh, both inclusive, is a median dark mark, which divides at each extremity, the anterior divisions divaricating slightly and becoming lost as they gradually merge in the ground colour; the posterior division divaricating decidedly and abruptly, and terminating at the posterior margin of the segment; each pair of divisions encloses a paler and somewhat triangular space, and these triangles meet base to base at the junction of the segments, thus forming a series of medio-dorsal lozenge-shaped markings, eight in number; in each dark marking are four white dots, and in each lozenge is a median longitudinal black and slightly waved line; the sides are delicately varied with different shades of sepia-brown, and every segment has a few scattered hairs. The other variety is green, and exhibits traces, more or less distinct, of the markings I have described. The caterpillars are full-fed about

the middle of June, when they spin a slight web between two leaves of the food-plant, and therein change to CHRYSALIDS.

The MOTH appears on the wing in June and July, and is common in many parts of England, Scotland, and Ireland. (The scientific name is *Cidaria ribesiaria.*)



361. The Chevron (*Cidaria testata*).

361. THE CHEVRON.—The palpi are rather long, pointed, and porrected; the antennæ of the male are slightly incrassated; the fore wings are rather pointed; their colour is reddish fulvous, having a gray or hoary appearance; the fulvous is of two shades; there is a basal blotch, a broad median band, and a hind-marginal blotch of a brighter and more distinct fulvous than the interspaces. The margins of these markings are clearly defined, and bordered more or less distinctly with white; the basal blotch and median band are slightly varied with irregular transverse lines of a more intense shade: the hind wings are very pale at the base, but rather darker and inclining to testaceous on the hind margin; below the middle they have a slender double line, the lower half of which is white; there appears to be no discoidal spot on either of the wings: the head and thorax have the fulvous colour of the fore wings; the body has the pale tint of the hind wings: the male is much larger than the female.

The CATERPILLAR, when full-grown, rests in a straight posture, and does not fall off its food-plant when disturbed; the head is flat and porrected; the body is cylindrical, without humps. The head is putty-coloured, with darker dots and reticulations; the body also is putty-coloured; the back has a slender median brown stripe; the sides have two dingy white stripes, the upper straight, the lower undulating: the spiracles are placed below the second white stripe, and are intensely black; the belly has six whitish stripes, of which the median ones closely approximate. The divisions of the segments are marked by slender rings of a pink tinge. It feeds on birch and sallow, and is full-fed at the end of May, when it spins a few threads, and draws together the leaves of its food-plant, making a very open kind of network cocoon, so open, indeed, as not in any degree to hide the enclosed CHRYSALIS, which will even drop out through the meshes if shaken. The chrysalis is rather long, and very pointed at the tail: it is of pale putty-colour, with a broad conspicuous median brown stripe down the thorax and body: the oblique posterior margins of the thorax are also of the same dark colour; the head and wing-cases are dingy brown, lined with darker brown, by which colour the antennæ, legs, wing-rays, &c., are clearly indicated: the antenna-case slightly exceeds that of the wings in length: on the body is a median dark stripe below, corresponding with that above, and the lateral region between these two stripes is spotted with dark brown.

The MOTH appears on the wing in July, and occurs commonly in many parts of England, Scotland, and Ireland. (The scientific name is *Cidaria testata.*)



362. The Northern Spinach Moth (*Cidaria populata*).

362. THE NORTHERN SPINACH MOTH.—The palpi are rather short; the antennæ of the

male very slightly thickened; the fore wings are scarcely pointed; their colour is yellowish fulvous, with a basal blotch, a median band, and an apical blotch, darker and interspersed with smoky-brown; the margins of these markings are clearly defined, and very dark; there is an indication, although indistinct, of a discoidal spot: the hind wings are very pale testaceous yellow: the head, thorax, and body are pale yellow.

The CATERPILLAR has the head rather small; the second segment also rather small; the third segment is swollen or furnished with a dorsal band, raised transversely. In colour it is remarkably variable, being of one or two tints of green, pale brown, reddish brown, or even dark brown: the raised band is dotted with white on a black or reddish ground, according as the ground colour of the caterpillar is dark or light. There is a medio-dorsal stripe of a reddish tint, and an olive-green stripe in the region of the spiracles. It feeds on the whortle-berry (*Vaccinium vitis-idæa*), and in confinement it will thrive on sallow. For these few particulars we are indebted to Mr. Hellins.

The MOTH appears on the wing in July, from the north to the south of England, and also in Scotland and Ireland. (The scientific name is *Cidaria populata.*)



363. The Barred Yellow (*Cidaria fulvata*).

363. THE BARRED YELLOW.—The antennæ of the male appear very slightly stouter than those of the female; the fore wings are of a fulvous yellow colour, with a median band of grayish-brown, which in recently disclosed specimens has a bloom or lustre on it much like that of a plum; this band is broadest at the costal margin, and there opens and includes a fulvous yellow space; about its middle a conspicuous angle projects towards the hind margin, and both its own margins are bordered with white; there is a pale triangular blotch at the tip of the wing on its costal margin, and an oblique sienna-brown mark adjoins this; at the base of the wing a triangular blotch is indicated but not pronounced: the hind wings are pale yellow, almost white: the head and thorax are fulvous yellow; the body very pale, almost white.

The CATERPILLAR is figured by Hübner, with the dorsal area glaucous green, the sides olive-green, and the incisions of the segments whitish. It feeds on the dog-rose (*Rosa canina*).

The MOTH appears on the wing in July, and is common both in Great Britain and Ireland. (The scientific name is *Cidaria fulvata.*)



364. The Barred Straw (*Cidaria pyraliata*).

364. THE BARRED STRAW.—The antennæ of the male are rather stouter than those of the female; the fore wings are rather narrow, pointed at the tip, and very slightly falcate; their colour is pale ochreous yellow, with three transverse brown lines, all of which are elbowed but not sharply angled; the elbow is directed towards the hind margin; the first is short and near the base, the second before the middle of the wing, and the third about the middle of the wing; between the third and the hind margin is a transverse series of smoke-coloured spots, sometimes conspicuous, at other times nearly obliterated; there is an oblique streak of the same colour at the tip of the wing; the basal portion of the fringe is pale yellow, the outer portion smoky-brown: the hind wings are very pale, and the fringe concolorous: the head, thorax, and body are pale yellow.

The Rev. H. Harper Crewe says that the CATERPILLAR is long, slender, and tapering

towards the head; the ground colour is grass-green; the central medio-dorsal line is broad and dark green; it is bordered on either side by a pale yellow line; the segmental divisions are yellow; the medio-ventral line is yellow; these caterpillars were hatched in March, from dark yellow eggs laid the previous August; they fed till the last month on the great hedge bed-straw (*Galium mollugo*), and afterwards on *Galium aparine*, and were full-fed the second week in May. The CHRYSALIS, which was enclosed in a slight cocoon among leaves, was pale drab, resembling in colour that of *Ennomos angularia*, or *E. erosaria*.

"A rather slender pale green caterpillar, with yellowish segmental divisions, and a broad dark green dorsal line, bordered on each side with yellow, which I found in spring feeding on cleavers (*Galium aparine*), produced this species, and I know it has also been both reared and taken on *Galium mollugo*. Query, Is Albin, as quoted by the *Manual*, right in giving whitethorn as the food? though I suppose it is certain that *Eupithecia vulgata* feeds on flowers of Ragwort, &c., as well as hawthorn."—*Rev. J. Hellins.*

The MOTH appears on the wing in July, and occurs rather frequently in different parts of England. Mr. Birchall has also taken it at Powerscourt and Howth, in Ireland. (The scientific name is *Cidaria pyraliata.*)



365. The Spinach (*Cidaria dotata*).

365. THE SPINACH.—The palpi are long and porrected, and the antennæ are simple in both sexes; the fore wings are ample, scarcely pointed at the tip, and not at all falcate; their colour is ochreous yellow, with darker transverse lines, all of which are sharply angled, the angles pointing towards the hind margin; the first and second of these lines are faint, slender, and near the base; the third is before the middle of the wing, and is very distinct; the fourth and fifth are slender and indistinct; the sixth is beyond the middle of the wing, and is very distinct, its interior margin is gradually shaded off into the paler ground colour; its exterior margin is sharply defined and accompanied by a paler line, which makes it still more conspicuous; there is a faint oblique streak at the tip of the wing, dividing the costal and hind margins, the former of which is the paler; the fringe is pale with eight brown spots; the hind wings are very pale, slightly yellower towards the hind margin; their fringe is pale, with four or five brown spots; the head, thorax, and body are pale yellow.

Mr. Wormald has described the CATERPILLAR thus: "It rests on the posterior claspers with the head and the legs contracted; it is smooth, without lumps or warts, long, slender, and attenuated towards the head; the colour is pale yellowish green, with the dorsal line darker, and the sub-dorsal lines pale yellow and indistinct; it feeds at night on the black currant (*Ribes nigrum*); its habit is very sluggish, remaining for several days on one twig, and feeding on all the leaves within its reach before changing its position. The EGGS were laid on the 3rd of August, and hatched in the second week of April, and the caterpillar was full-fed at the beginning of June, when it spun a slight cocoon on the surface of the ground. The CHRYSALIS is pale yellow, and semi-transparent." Mr. Doubleday informs me that at Epping this caterpillar always feeds on the red currant.

The MOTH appears on the wing in June, and has been found in many parts of England, north and south. Mr. Birchall has taken it at Cork, Powerscourt, and Kingstown, in Ireland. (The scientific name is *Cidaria dotata.*)

Obs.—This moth has been honoured with four names; it is the *Dotata* of Linneus, the *Bilineata* of Sepp, the *Associata* of Borkhausen, and the *Spinaciata* of Haworth.



366. The Dark Spinach (*Pelurga comitata*).

366. The Dark Spinach.—The antennæ are simple in both sexes; the fore wings are ample, pointed, and slightly falcate; their colour is tawny yellow, with a small triangular basal blotch, and a broad median band, the exterior margin of which has a large rounded lobe in the middle, and a smaller one near the hind margin; the basal portion of the blotch and the middle of the band are of the same colour as the rest of the wing, but the margins of both are darker, approaching to brown, the brown being disposed in waved lines; there is a small but intensely black discoidal spot in the median band: the hind wings are dull brownish yellow, the basal portion slightly darker; the head, thorax, and body are dull ochreous yellow.

The caterpillar generally rests in a straight position, except that the posterior extremity is raised and the anal claspers are not attached to the food-plant; but sometimes the ventral and anal claspers are both firmly attached, the legs and anterior segments held clear of the food-plant, and the back arched; when annoyed it falls to the ground and lies quite motionless, bent nearly double, and bent again at the ventral claspers, the following segments standing out at an obtuse angle with the loop. The head is narrower than the second segment, the anterior margin of which forms a kind of cup, receiving the head; the face is very flat, and the crown without any conspicuous notch; the body is stout and has a dilated skinfold, which is deeply indented at the incisions of the segments, giving the sides of the caterpillar when viewed from above a serrated or notched outline. The colour of the face is dark smoky-brown, almost black, but the sides of the head and the region about the mouth are paler; the entire head is rather glabrous: the colour of the body is dull opaque olive-brown, with slender rivulet smoke-coloured dorsal stripes, very indistinct except on the anterior segments; on the fifth, sixth, and seventh segments is a dorsal longitudinal series of three yellow dots on each side, and between each series, on the posterior margin of the segment, is a transverse median yellow spot; an oblique shade passes forwards from each side of each segment, outside the median yellow spot and inside the three yellow dots; the combination of each pair of these oblique shades forms a V-shaped ornamentation; there are four minute white warts, arranged in a quadrangle, on the back of each segment after the fourth, and each wart emits a small black bristle; the dilated skinfold is of a pale but not vivid pink; the ventral is paler than the dorsal area, and there is a narrow medio-ventral stripe still paler, but intersected by a slender smoke-coloured line; this only extends from the third pair of legs to the ventral claspers; there are many minute blackish warts on the ventral surface, each emitting a bristle; the legs are very pale, the claspers concolorous with the body. It feeds on the various species of goose-foot (*Chenopodium*), and is full-fed early in September, when it changes to a chrysalis on the surface of the earth, and remains in that state throughout the winter.

The moth appears on the wing in July, and has been taken in most of our English counties, both north and south, also in Scotland, and Mr. Birchall records it as of common occurrence at Howth, in Ireland. (The scientific name is *Pelurga comitata*.)



367. The Mallow (*Eubolia cervinaria*).

367. The Mallow.—The antennæ are pectinated in the male, simple in the

female. The fore wings are ample, pointed at the tip, slightly falcate, and have a sinuous hind margin; their colour is brown, with a tinge of vinous red, particularly observable in recently disclosed specimens, but always present in a greater or less degree; they have a basal blotch, and a median band somewhat darker, and both these markings are darker at their margins, which are succeeded and bounded by a slender sinuous white line; the hind wings are rather lighter than the fore wings, and exhibit traces of a darker median band; there is a thread-like white line on the hind margin of all the wings; the head and thorax are of the same colour as the fore wings; the body of the same colour as the hind wings.

The CATERPILLAR rests by day in a straight position on the under side of the leaves, or on the leaf-stalk, of the common mallow (*Malva sylvestris*), on which plant it feeds: when annoyed it tucks in its head, forming the anterior part of the body into an Ionic volute, which becomes tighter as the annoyance continues, until at last the claspers lose their attachment, and the caterpillar falls to the ground, a compact but not uniform ring, which closely resembles the curious seed of the mallow, so familiar to all of us, when children, under the name of "cheeses." When the caterpillar is stretched out at length, and rigidly straight, it has an equal resemblance to the leaf-stalks of the same plant. The head is rather narrower than the second segment, scarcely notched on the crown, and semiporrect: the body is cylindrical and slightly scabrous, the scabrosity being caused by the presence of minute warts, some of which are somewhat larger than the rest, and each emits a bristle from its summit; on each segment there are usually six of these bristle-bearing warts, four of them arranged in a dorsal quadrangle: the colour of both head and body is opaque apple-green, the latter with a medio-dorsal, narrow, and indistinct stripe of a smoky-green hue, evidently due to the presence of food in the alimentary canal: the warts are white; the ventral is concolorous with the dorsal area, and the claspers are of the same hue; but the legs are almost colourless, and very nearly transparent. These caterpillars are full-fed in June, and then retire below the surface of the earth to undergo pupation.

The MOTH appears on the wing in September, and is recorded as having been taken in many English counties, and also in Scotland, and Mr. Birchall says it is common at Howth, in Ireland. (The scientific name is *Eubolia cervinaria*.)



368. The Fortified Carpet (*Eubolia mæniata*).

368. THE FORTIFIED CARPET. — The antennæ of the male are slightly pectinated; the fore wings are pointed at the tip, but in no degree falcate; their colour is leaden-gray, with a broad median band, the interior margin of which is very straight, and is bordered by a quadruple line, the first portion of which is ochreous, the second ferruginous, the third ochreous, and the fourth ferruginous; equidistant between this and the band is a zigzag ferruginous line; the exterior margin of the band has a prominent median lobe directed towards the hind margin, and bordered by a distinct white line; the band itself has the middle area leaden-gray, shading off to rich sepia-brown at both margins; the exterior brown portion is much the broadest; there are two small and circular discoidal spots; the hind margin is clouded with darker brown; the hind wings are gray-brown; the head, thorax, and body have the same tints as the wing.

The CATERPILLAR is "ashy-gray, more or less reddish, dotted with brown; dorsal line brownish, with black longitudinal streak. (*Treitschke*) On broom."—*Stainton's Manual*, vol. ii. p. 119.

"The MOTH appears on the wing in June and again in August in pine woods and

heaths on the stony declivities of the Alps, Pyrenees," &c. (*Guenée*). "Once near Baron Wood, Carlisle" (*Stainton*). A second specimen is reported as having been taken in 1866. I copy the record: "On the 19th of August last I took what I thought to be a good variety of *E. mensurata*; a few weeks ago, when examining the specimen more closely, I found it answered exactly the description in *Stainton's Manual* of *E. mæniata*. I took it by beating broom."—*W. Prest. York*, Jan., 1867. (The scientific name is *Eubolia mæniata*.)

Obs.—The description and figure are taken from an authentic Continental specimen: I never saw a British one.



369. The Small Mallow (*Eubolia mensuraria*).

369. The Small Mallow.—The antennæ of the male are pectinated, those of the female simple; the fore wings are pointed at the tip, and very slightly falcate; their colour is clear but rather pale brown, with a broad median band of a darker tint; this median band includes two lines of a still darker tint; the interior of these is much more slender than the exterior; between them is a small but conspicuous black discoidal spot; at the extreme tip of the wing is a short oblique dark streak; the hind wings are pale gray-brown with a darker median line faintly indicated: the head, thorax, and body are brown.

The caterpillar of this common insect is unknown to me, and I do not find any published description.

The moth appears in June and July, and occurs commonly in the south of England, and probably also in the north, and Mr. Birchall describes it as being common in Ireland. (The scientific name is *Eubolia mensuraria*.)

Obs.—This moth is the *Chenopodiata* of English authors.



370. The Belle (*Eubolia palumbaria*).

370. The Belle.—The antennæ are pectinated in the male, simple in the female; the fore wings are pointed at the tip and lead-coloured, with three transverse brown lines, the first is oblique and near the base; it is very slender, and both its margins are clearly defined; it is sometimes slightly sinuous, but generally direct; the second is oblique and situated before the middle of the wing; its interior margin is sharply defined, the exterior margin shading off gradually into the ground colour; the third is still more oblique, its interior margin shades off gradually into the ground colour, its exterior margin is sharply defined; between the second and third lines is a conspicuous black discoidal spot; at the extreme tip of the wing is a short oblique streak of the same colour as the transverse lines; the hind-marginal area is not unfrequently of two shades of colour, the exterior being the lighter, and the division between the two acutely zigzag: the hind wings are pale gray-brown; the head, thorax, and body are of the same lead-colour as the fore wings.

The caterpillar feeds by night only on needle green-weed (*Genista Anglica*), and sometimes, but less frequently, on the common broom (*Spartium scoparium*). Mr. Hellins informs me that Mr. Buckler has figured it, and has represented it as of a very pale stone-colour with interrupted dorsal and sub-dorsal lines, and apparently with three fine irregular lines above the spiracles. Another variety is dark gray on the back, the black dashes of the interrupted dorsal line alternating with small light oblong spots, which occur just before the segmental divisions. They appear to be full-fed in May.

The moth appears in June, and continues on the wing for some months; it is common in all the southern and several of the

northern English counties; it has also been taken in Scotland, and, according to Mr. Birchall, is common in Ireland. (The scientific name is *Eubolia palumbaria.*)



371. The Chalk Carpet (*Eubolia bipunctata*).

371. THE CHALK CARPET. — The palpi are rather short, very approximate and beak-like; the antennæ of the male are pectinated, of the female simple; the fore wings are rather pointed, and of a chalky-gray colour, with a median band, both the margins of which band are darker, but its median area is of the same tint as the rest of the wing, and includes two small round black spots placed transversely in place of a discoidal spot: the hind wings are gray tinged with smoky: the head, thorax, and body are of the same chalky colour as the fore wings.

The CATERPILLAR is obese, pale brownish-gray, with darker dorsal and sub-dorsal stripes (*Treitschke*). — *Stainton's Manual*, vol. ii. p. 49.—It feeds on the Bird's-foot Trefoil (*Lotus corniculatus*) and hybernates when very small.

The MOTH appears on the wing in July: it is excessively abundant on the chalk hills of Kent, Sussex, and Surrey, and it is said also to be found in the north. It occurs in Mr. Greene's List of the Lepidoptera of Ireland, but no locality is given. (The scientific name is *Eubolia bipunctata.*)



372. The Oblique-striped (*Eubolia lineolata*).

372. THE OBLIQUE-STRIPED. — The antennæ of the male are almost simple; the fore wings are pointed; their colour is gray, with three compound bars, which are uniformly oblique but direct, that is without conspicuous angles: the first of these is near the base, and treble, dark brown, and intersected by a pale line; the second bar is quadruple, the first portion white, the second dark brown, the third pale brown, the fourth dark brown: between the second and third bars is a distinct discoidal spot: the third bar is sextuple, the shades are arranged thus—light brown, white, dark brown, light brown, dark brown, white; there is also a short dark streak descending from the extreme tip towards the middle of the wing: the hind wings are gray, with transverse lines both darker and lighter: the body is gray.

The CATERPILLAR is figured by Hübner feeding on ladies' bedstraw (*Galium verum*); its colour is represented as wainscot-brown, with a medio-dorsal and lateral line darker brown; the latter is bounded by a narrow yellow line. Mr. Hellins informs me that Mr. Buckler has figured it, and that his figure represents the caterpillar as "pinkish on the back, with the dorsal and spiracular lines dark green, the latter edged below with pale green." Mr. Hellins adds, "My own recollection of two caterpillars I once possessed is somewhat nearer Hübner's description as given in the *Manual.*"

The MOTH appears on the wing in May and June; it is abundant on the coast of Sussex and on the Cheshire side of the Mersey; it has also been taken in Cambridgeshire, and, by Mr. Birchall, on Mangerton mountain near Killarney, at a considerable elevation—a strange locality, as Mr. Birchall well observes, for this coast insect. (The scientific name is *Eubolia lineolata.*)

Obs.—Guenée says that this species varies infinitely, and explains particular variations at some length; nevertheless, I do not find any variations that strike me as worth figuring; the beautiful varieties of the two species next following have been most obligingly lent me for this work by Mr. Bond. I allude to the second and third figures of *Carsia imbutata* and the second figure of *Anaitis plagiata.*



373. The Manchester Treble-bar (*Carsia imbutata*).

373. The Manchester Treble-bar.—The palpi are very scaly, porrected, and the points slightly deflected in the form of a hooked beak; the antennæ of the male are pubescent; the fore wings are slightly pointed, and their costa is perfectly straight; their colour is ashy-gray with a short oblique brown line near the base, and a broad median band of an umber-brown colour, and doubly angulated on its outer margin; this band opens at both extremities, and includes a gray space at each end; sometimes the gray spaces unite and form a pale band within the dark one; both margins of the median band are slenderly bordered with white; the broad hind-marginal area is clouded with purple-brown, and surrounding each of the two principal angles of the median band is a suffused blotch of a brickdust-red colour: the hind wings are gray-brown: the head, thorax, and body are cinereous gray.

The caterpillar feeds on the cranberry (*Vaccinium oxycoccos*); I have never seen it. Freyer describes it as "reddish yellow, with three wide stripes down the back; spiracular line yellowish white."—*Stainton's Manual*, vol. ii. p. 120.

The moth appears on the wing in July, and is very local. I have it from the neighbourhood of Manchester, where it appears abundant; it has been received from Scotland, and Mr. Birchall has taken it at Howth, in Ireland. (The scientific name is *Carsia imbutata*.)



374. The Treble-bar (*Anaitis plagiata*).

374. The Treble-bar. — The antennæ are simple in both sexes; the fore wings are ample and rather pointed at the tips; they are of a distinct dove-colour, and traversed by transverse markings, the first of which is near the base, and is sharply bent as it crosses the sub-costal ray; it is rather broad at the costal margin, very narrow and linear at the inner margin, it opens at the flexure and contains a small dove-coloured space; the second marking is rather before the middle of the wing, and may be called a triple bar; it is single at the costal, and triple at the inner margin; the third may also be called a triple bar; it has two sharp angles on the outer side; as it approaches the inner margin it bends slightly towards the anal angle of the wing; just on the costal margin the three lines forming this bar are united: there is a short longitudinal black streak at the base of the wing, four faint transverse lines between the first and second of the principal markings (two of them very imperfect), a faint linear discoidal spot between the second and third (triple) bars, three faint lines between the third (triple) bar and the hind margin, and finally, a short oblique black streak running from the tip of the wing, and terminating in a little rust-coloured cloud before it reaches the upper angle of the triple bar: the hind wings are smoky-gray, with a double median trans-

verse line, the inner portion of which is darker, the outer lighter than the disk of the wing; near the base of the wing is a faint discoidal spot: the head, thorax, and base of the body are dove-coloured, the rest of the body pale brownish-gray.

The CATERPILLAR rests in a nearly straight position with the claspers only attached, but bends itself in a loop when annoyed: the head is about equal in width with the body, prone, rounded on the crown, and partially immersed in the second segment; the body is cylindrical, the segments wrinkled transversely; the anal flap is truncate at the extremity. The colour of the head is wainscot-brown; the dorsal area of the body wainscot-brown, with a paler, almost yellow, space at the interstices of the segments; and there are a number of darker rivulet lines extending the entire length of the back, and these are particularly conspicuous when passing through the yellow spaces already mentioned; these darker markings approximate and unite in the anal flap; on each side is a narrow yellow stripe commencing at the head and terminating in the anal flap; the upper margin of this stripe is vague, fading off into the dorsal area, the lower margin is sharply defined, and contrasts strongly with the ventral area, which is dark brown with a medio-ventral stripe rather paler: the lens and claspers are nearly of the same colour as the ventral area. It occurs twice in the year, feeding on the leaves and flowers of the perforated St. John's wort (*Hypericum perforatum*), but chiefly among the flowers. The CHRYSALIS is of a reddish-yellow colour irrorated with white; it has a small scabrous plate of a reddish-brown colour on each side of the neck at the base of the tippets; this plate is connected with the first spiracle.

The MOTH appears on the wing in May and June, and a second brood in August and September: my specimens of the second brood are much smaller and less distinctly marked than those of the first. It occurs in many of our English counties, both north and south; also in Scotland; and Mr. Birchall informs us it is common and generally distributed in Ireland. (The scientific name is *Anaitis plagiata*.)



375. The Pale Gray Carpet (*Lithostege griseata*).

375. THE PALE GRAY CARPET.—The fore wings are sharply pointed at the tip, and of a whitish-gray colour, in some specimens deepening into a smoky tint; there is an oblique stripe extending from the tip of the wing to the inner margin just within the anal angle; the hind wings are whitish at the base, and slightly tinged with smoke-colour towards the hind margin: the head, thorax, and body are extremely pale gray, almost white: the dull tint more or less observable in this moth is due to minute black dots, most of them consisting of single scales only.

I am indebted to Mr. Hellins for the following description of the CATERPILLAR:—

"To Mr. T. Brown of Cambridge I am indebted for a liberal supply of the eggs and caterpillars of this species, as well as for the food-plants, without which I could not have reared them. Mr. Brown having found the caterpillars feeding on the seed-pods of *Sisymbrium Sophia*, last year kindly sent me seeds (as he believed) of this mustard, in order that I might be prepared for the coming season of 1867; it has turned out, however, that the seeds so sent were those of *Erysimum cheiranthoides*, but fortunately the mistake did no harm; the caterpillars hatched here from the egg took to the *Erisymum* at once, and throve on it well; whilst those captured at large on *Sisymbrium Sophia*, when sent to me did not make much difficulty about taking to their *substitute* food, and lost no time in completing their full growth on it.

"I received eggs on June 18th and 25th; the caterpillars appeared soon afterwards, and took about a month to feed up, all being in chrysalis by August 1st. Two days after this date Mr. Brown sent me some more caterpillars, just captured by himself, and these continued to feed for nearly a fortnight longer.

"The CATERPILLAR, when full grown, is nearly an inch long, rather slender, of uniform bulk throughout, rather flattened beneath; head rather large and rounded. There are several varieties in colour and markings, but as all the captured specimens sent to us by Mr. Brown were of one variety, I have, at Mr. Buckler's suggestion, taken this as

"*Var.* 1.—Ground colour a dull olive-green, except the spiracular region, which is a pale yellow; a thin dorsal line of a darker tint of the ground colour; sometimes there is a similar line on either side of it, and sometimes these lines appear only as two olive-brown or purplish wedges just before each segmental fold; sub-dorsal line greenish-gray with darker edgings; the spiracles are black, and above and just behind them, in the yellow spiracular stripe, are suffused blotches of the colour of the dorsal edges.

"*Var.* 2.—Ground colour of a fresher, more yellowish green, with the dorsal region of a full green; spiracular region yellowish, and the blotches in it of darker purplish tint than in No. 1, and more clearly defined in shape.

"*Var.* 3.—Ground colour greenish white; three very fine purplish-brown or blackish lines down the back, of which the central one becomes wider and darker just *before* each segmental fold, and the other two *across* the fold; sometimes these lines are interrupted, and appear only in the thickened parts; sometimes again there is a transverse band uniting the base of all three of these dashes; the sub-dorsal line paler than the ground, but edged below with the dark colour; the spiracular region of the ground colour, with the wedge-shaped blotches not only above the spiracles, as in the other varieties, but also with similar ones below again, and in some specimens the spiracular stripe itself interrupted by these pairs of upper and under blotches being partially united.

"The anal flap and the anal pair of claspers dark blackish green or purplish brown.

"Varieties 2 and 3 were reared from the egg on *Erysimum cheiranthoides*.

"The larvæ went underground to undergo their final change."

The MOTH appears on the wing in June, and has been found in two localities only; the first specimen was taken at Thetford by a Miss Clarke, and was unique for many years in the cabinet of the late Mr. Curtis, where it stood under the name of *Minoa Clarkiata:* it was subsequently named *M. niveata,* by Mr. Stephens. Mr. Doubleday afterwards received a pair among a number of insects collected by a boy of the name of Reynolds, a son of Mr. Reynolds the bird-stuffer. The late Mr. Bouchard determined on finding the insect, and within the last few years supplied some of our cabinets. It has also been taken at Brandon. Its economy was unknown until discovered last year by Mr. Brown, of Cambridge, as recorded above. (The scientific name is *Lithostege griseata.*)

Obs.—Guenée considers this moth identical with the *Phalæna asinata* of Fabricius.



376. The Streak (*Chesias spartiata*).

376. THE STREAK. — The antennæ are simple in both sexes; the palpi long and porrected in the form of a beak; the fore wings are long, obtusely pointed, and narrow, with a shining silky lustre, and of a grayish-brown colour with a very pale, almost white, stripe extending from the base to the extreme tip; there is also a transverse series of three almond-shaped blotches across the middle of the wing; these are very nearly concolorous with the general area of the wing, but frequently have pale margins and pale centres, which make them conspicuous; the white stripe passes between the first and second of these blotches; parallel with the hind margin is a pale oblique line accompanied by a broader rust-coloured stripe; the hind wings are pale grayish brown: the head thorax, and body are darker and silky.

The head of the CATERPILLAR is pale green and unicolorous; the dorsal area is a deep green colour, with certain stripes distinctly marked; the medio-dorsal stripe is dark between two lines of bright green; on each side of this is a whitish stripe shaded below with dark green; below this, in the region of the spiracles, is a white stripe; the spiracles above are reddish and surrounded with pale yellowish green; the ventral area is green with three white stripes. It feeds on the common broom (*Spartium scoparium*). I have freely translated this from Guenée's description (*Uran. et Phal.*, vol. ii. p. 506).

The MOTH appears on the wing in September; it has been taken in the north, south, east, and west of England, and near Glasgow, and Mr. Birchall informs us there is a specimen in the late Mr. Tardy's Irish collection, but its habitat is unknown. (The scientific name is *Chesias spartiata.*)



377. The Broom Tip (*Chesias obliquaria*).

377. THE BROOM TIP.—The antennæ are simple in both sexes; the palpi rather long and porrected, in the form of a beak; the fore wings are long, obtusely pointed, and narrow, with two indistinct angled lines before the middle, and a dark abbreviated band beyond the middle; this band originates on the costal margin, and is conspicuous half-way across the wing, whence it is continued as a very indistinct double line to the inner margin; between the abbreviated band and the tip is a smoky costal blotch; there is a broad hind-marginal band of a smoky-gray colour intersected by a submarginal pale scalloped line; the head, thorax, and body are of the same colour as the fore wings.

Mr. Machin beat seven or eight of the CATERPILLARS off common broom (*Spartium scoparium*) in 1856, and bred the perfect insect in 1857: it closely resembles the caterpillar of *C. spartiata*, but is of a rather darker green, and wants the yellowish tinge; Mr. Machin also thought it thicker towards the head, and not quite so smooth. It feeds exclusively on the common broom (*Spartium scoparium*).

The MOTH continues on the wing from the middle of May to the middle of July; Mr. Machin took it without intermission from the 20th of May to the 7th of July. It occurs in Surrey, Kent, and Suffolk, and has also been taken in Scotland. (The scientific name is *Chesias obliquaria.*)

Obs.—This insect is called "the Chevron" by Donovan, a name which belongs properly to *Cidaria testata;* and "the Broom Buff tip" by Harris and Stephens: I have adopted Haworth's English name in order to avoid confusion.



378. The Chimney Sweeper (*Tanagra chærophyllata*).

378. THE CHIMNEY SWEEPER.—The fore wings are rather ample and rounded at the tip; their colour is sooty black, the fringe snowy white at the tip and interspersed with white on the hind margin: the hind wings, head, thorax, and body are sooty black.

Mr. Buckler has thus described the CATERPILLAR from specimens found by Mr. Howard Vaughan, to whom we are indebted for the discovery of its food-plant: "When full-grown, is nearly three-quarters of an inch in length, cylindrical, short in proportion, and almost equally thick throughout, rather shining, and with distinct lines, as follows:—Ground colour of the back green or bluish green, becoming on the sides gradually paler towards the spiracular regions. The dorsal line is darker green, and on the anal segment becomes dark red and thicker, forming a very conspicuous mark. The sub-dorsal stripe is of a darker green than the ground colour, running between two fine lines of pale whitish-green,

which in some individuals are also seen to be very finely edged externally with darker green. The spiracles are red, and below them the green fades into a whitish stripe, and it is forcibly contrasted beneath by a darker tint of the green of the back softening gradually into a paler green on the ventral surface, where there are three longitudinal whitish stripes, the middle one being the widest." It feeds on the blossoms of the common earth-nut (*Bunium flexuosum*) during the month of May; the specimens described above descended to the earth to undergo pupation by the 8th of June.

The MOTH appears on the wing at the end of June, and is extremely common in many parts of England, both north and south: I have also found it in countless thousands in Scotland, at Inverary, the seat of the Duke of Argyll, and generally in the lowlands of Scotland. Mr. Birchall found it commonly in Ireland. (The scientific name is *Tanagra chærophyllata*.)

CUSPIDATES.



CATERPILLARS OF CUSPIDATES.

1. *Platypteryx Sicula.*
2. *Cilix Spinula.*
3. *Dicranura Furcula.*
4. ,, *bicuspis.*
5. ,, *bifida.*
6. *Dicranura vinula.*
7. *Hoplitis terrifica* (not British).
8. *Stauropus Fagi.*
9. *Notodonta camelina.*
10. ,, *bicolor.*
11. *Notodonta cucullina.*
12. ,, *ziczac.*
13. ,, *trilophus.*
14. *Endromis versicolor.*
15. *Petasia cassinea.*

THE NEXT PRINCIPAL DIVISION OR TRIBE of Moths is called Cuspidates (in science *Cuspidatæ*) from the singular form of the caterpillars, which frequently end in a sharp point; but in this, as in many other instances, the name of the division does not strictly apply to all of the contents of the division; thus the Hook-tips terminate in a single point (figure 1), the Puss-moths in two points (figure 6), and the Prominents are not pointed at all (figure 13). In order to be perfectly understood, I must here introduce, in as few words as possible, a few general remarks on the structure of caterpillars, although I am fully aware that in doing so some little repetition is unavoidable.

The caterpillars of moths and butterflies invariably have the body divided into thirteen segments or rings; the first of these is the head, the second bears a pair of legs, the third a pair of legs, and the fourth a pair of legs, so that every caterpillar, like all other insects, has six legs, and six only; these are hard, horny, and pointed at the tip, and are constantly used by the caterpillar for holding its food firmly; while it is eating the edge of the leaf is brought to the mouth, and is devoured by a series of mouthfuls, the first taken as far as it can reach (as represented in figure 10), the next a little nearer, and the next still nearer, until at last the head is brought quite up to the legs (as represented in figure 4), and the leaf shows by a semi-circular notch how much is gone. No sooner has the mouth been brought up to the legs than it is stretched out again, and the same operation is repeated. The legs are also used in walking, but the principal use seems to be holding the food steadily while it is being eaten. In what are considered very scientific entomological writings, the legs are often called *pro*-legs or *fore*-legs; this term, however, could only be strictly applied to the first pair, and is moreover objectionable, because it has been transferred by Messrs. Kirby and Spence to the claspers, and it creates confusion if we apply the same name to two parts which are decidedly different. The fifth and sixth segments have neither legs nor claspers; the seventh, eighth, ninth, and tenth segments have each a pair of claspers; these are circular or oval disks furnished with a fringe of incurved prehensile hooks, which enable the caterpillar to adhere tightly to any object on which it may be resting—so tightly, indeed, that rain and wind in moderation cannot remove it. These claspers, as I have said, have also been called *pro*-legs, and as Messrs. Kirby and Spence are the greatest and best entomological teachers this country has ever produced, the error has been repeated by others up to the present day. This is one of the very numerous proofs how dangerous it is for those who have established a reputation to make the slightest mistake; the mistake generally proves more attractive than the entire mass of truthful teaching which the same authors may have diffused.

In the Geometers we have seen that the claspers are usually absent from the seventh, eighth, and ninth segments; in Cuspidates they are present on these as well as on the tenth segment, but are often absent from the thirteenth, and if present are almost invariably useless; sometimes, indeed, they appear to be converted into horn-like appendages, which stand nearly erect (see figure 8). Many of these curious caterpillars spin a sort of filmy surface-web, or coating of silk, on the upper side of a poplar or willow leaf, in order to insure a safer holding for their claspers; this is more particularly the case when they are about to undergo a change of skin; on such occasions it is not uncommon for the Puss-moth or Kittens to remain perfectly motionless for two or three days. And not only at such periods, but also daily, may these curious caterpillars be found in such situations exposed to the full light of sunshine, and scarcely moving or eating whilst daylight lasts. Their voracity by night makes ample amends for their abstinence by day. Many of these caterpillars have humps on their back, giving them a very singular appearance (see figures 7, 12, and 13). No Cuspidate caterpillar has the power of rolling itself in a ring, and in this form of falling to the ground in order to escape observation: it would seem that their general resemblance in colour to the leaves

on which they feed answers the same purpose of concealment from their enemies.

The colour of Cuspidate caterpillars varies greatly in different species, but there is a fashion or method both in the tone and disposition of the ornamentation; the prevailing tint is a delicious apple-green, and the distribution of colours, when these are various in the same caterpillar, is generally referable to two or three different types; the first of these is the division of the body into two distinct areas, a dorsal area, which is purple or pink or brown, and a ventral, which is green; the boundary line between the two colours is straight in the Hook-tips (figure 1), but in the Puss-moth (figure 6) it ascends to the middle of the back about the fifth segment, and then descends to the pointed extremity. Another type is the longitudinally striped (figure 10), and a third has a series of oblique stripes on the sides, generally six or seven in number (figure 14); each of these oblique stripes commences near the spiracles, and is continued upwards and forwards in direct contrast to the striping of the Sphingiforms, which, commencing in the same part of the caterpillar, is always directed upwards and backwards, the last stripe terminating in the caudal horn.

The mode of pupation is various; some of the Cuspidates, as the Puss-moth, form very tough cocoons, made of glue, and sparingly mixed with sawdust of their own fabrication. These cocoons are attached so closely to the bark of trees, and are so much of the same colour, that it is impossible for the uneducated eye to detect them; and thus they escape alike the notice of men, mice, and birds, although generally constructed in the most exposed places. Sometimes these cocoons form a little lump or excrescence on the smooth trunk, but at other times the caterpillar selects a crack in the bark, and filling it up exactly to the level utterly defies the skill of the most expert searcher. It may here be observed that the glue of which these cocoons is made is nothing more than condensed or coagulated silk, or reversing the order, silk is nothing more than spun glue, and whether the substance be produced in the form of glue or silk, it has a remarkable power of resisting wet, which seems to have no effect on it whatever. At the period of emergence the moth, by some unknown process, has the power of softening this material and entirely overcoming its tenacity; and whether in the form of glue or silk, the substance yields at once to the emerging moth, which escapes through an aperture produced by some mechanical or chemical means that we have not yet discovered.

Other species of Cuspidates undergo their metamorphosis in a slight web which the caterpillars spin between the leaves of the tree on which they feed; these united leaves falling during the autumn or winter, are converted into a kind of parachute, in which the enclosed chrysalids are floated gently and safely to the ground, there to remain among fallen foliage until the advent of spring calls them into their winged existence. Other species, again, turn to chrysalids on the surface of the earth without even the pretence of a cocoon; and two or more have been ascertained to bury themselves deeply in the earth, provided, in all probability, with some mechanical contrivance for ascending through the superimposed earth when the period for the final change has arrived.

The moths themselves have generally small and short palpi, and very short and insignificant trunks, or, as these are more properly called, *maxillæ*. I allude, of course, to the spiral tube which we find wound up in a ring, like the spring of a watch, beneath the heads of butterflies and moths. This beautiful apparatus, so well adapted for sucking the honey, or nectar, from flowers, although so like a tongue, is not really one, but is composed of two long flexible jaws.

Following, as I have done throughout, the arrangement of my friend Mr. Doubleday, which is printed for cutting out and placing in slips below the insects themselves when arranged in cabinets,* I do not consider myself at liberty to make any

* Synonymic List of British Butterflies and Moths. By Henry Doubleday. Price One Shilling and Sixpence. Sold by all London Booksellers.

alterations; otherwise I should feel inclined to place the beautiful Kentish Glory (*Endromis versicolor*) next to the Great Prominent (*Notodonta trepida*), to which it is so nearly allied; and to remove the chocolate-tips (*Clostera*), and, perhaps, also the buff-tips (*Pygæra*) to the neighbourhood of the genus *Cymatophora*, to which they are very closely related.

With regard to the proper place of the Cuspidates in a natural system, I also differ from my friend. I incline to place them in close proximity to the Sphingiforms, especially the genus *Smerinthus*, and I think they should be followed by the Tau Emperor (*Aglia tau*), introduced by Haworth as a British insect; and this again by the Verticillates, of which the Emperor moth (*Saturnia Carpini*) is the only British example, but which contains three European and a host of Asiatic and American species, some of them lately rendered very interesting from the praiseworthy attempts to obtain silk from their cocoons.



379. The Scalloped Hook-tip (*Platypteryx lacertula*).

379. THE SCALLOPED HOOK-TIP. — The palpi are very small, scarcely perceptible; the antennæ of the male are decidedly pectinated, those of the female very slightly so; the wings are broad and ample; the fore wings are pointed at the tip, falcate, and have the hind margin toothed; the teeth or angles are five in number, three small ones immediately below the tip, and two larger ones below these; their colour is wainscot-brown, having two oblique transverse lines, the outer of which is angled immediately after leaving the costal margin; between these is a small circular discoidal spot; there is great diversity in colour in different specimens varying from wainscot-brown to umber-brown; and in the male the hind-marginal area is traversed by a transverse whitish bar: the hind wings are paler, and have a very minute discoidal dot.

This species is double-brooded, the caterpillar occurring in June and again in September. The EGG is laid on birch (*Betula alba*) in June, and the CATERPILLARS, hatching in about two weeks, feed on the leaves; they are full-fed in September, and then spinning a slight cocoon among the leaves, turn to CHRYSALIS and remain in that state during the winter; when full-fed the caterpillar rests in nearly a straight position, but with both extremities slightly raised, the ventral claspers only being attached to a silken pad which is apparently spun for the purpose of affording a safer foothold: when jerked by a sudden blow, it falls hanging by a thread; the head is as wide as the second segment, prone, and slightly indented on the crown; the body is rather depressed, and has two tubercles placed transversely on the back of the third and fourth segments, and two much smaller ones on the twelfth: its colour is yellowish-brown, blotched, and variegated with darker brown.

The MOTH appears on the wing in June and September. It occurs not uncommonly in the southern counties of England, but not so commonly in the north. (The scientific name is *Platypteryx lacertula*.)

Obs.—The figures were drawn from specimens very differently coloured, in the hope that the difference would be exhibited in the engraving: this unfortunately is not sufficiently the case.



380. The Scarce Hook-tip (*Platypteryx sicula*).

380. The Scarce Hook-tip.—The palpi are very short, entirely concealed when the insect is viewed from above; the antennæ are strongly pectinated in the male, simple in the female; the fore wings are falcate and sharply pointed, and the hind margin is deeply concave below the tip. The colour is isabelline, or testaceous fawn-colour, with darker clouds of the same colour; these are in the centre of the wing; and near the hind margin, and parallel with the hind margin, are certain pure black markings which assume a somewhat crescentic form.

The caterpillar rests with the anal extremity elevated, the feet and ventral claspers touching the food-plant. The head is slightly broader than the second segment; the body is somewhat shuttle-shaped; the anal extremity tapering to a sharp point, and the anal claspers being entirely absent; there are two pyramidal papillæ placed transversely on the back of the third, fourth, fifth, and sixth segments, making eight in all; the colour of the head is reddish, with two transverse whitish bars; the dorsal area of the body, including the papillæ, is ochreous; the papillæ are tipped with white; the ventral area is glaucous; the two areas are separated by a white stripe, which is intersected throughout by a delicate pink line; there is a medio-dorsal series of linear black streaks, and there are two oblique linear black streaks on each side of each segment; the legs are greenish; the claspers are glaucous, concolorous with the ventral area; each segment has also two white dots on each side of each segment; the chrysalis is rather stout, with a bifid head and a very sharp-pointed tail.

The moth appears on the wing at the end of May and beginning of June. It occurs in Leigh Woods, near Bristol, where a few specimens only have been taken. (The scientific name is *Platypteryx sicula*.)



381. The Pebble Hook-tip (*Platypteryx falcula*).

381. The Pebble Hook-tip.—The antennæ are pectinated in the male, almost simple in the female; the wings are broad and ample, the fore wings pointed and falcate, the hind margin without teeth or angles; their colour is wainscot-brown, frequently suffused with a richer, redder brown; there is an oblique bar of this richer tint from the top of the wing to the inner margin, and there are four transverse zigzag dark brown lines, which are equidistant at the costal margin, but diverge more or less on the disk of the wing; between the second and third of these are two small discoidal spots placed longitudinally; just within the third line, and nearly in the centre of the wing, is a large roundish blotch; the fourth or outer zigzag line crosses the oblique bar near the tip of the wing, and running parallel with the hind margin is broken up into dots: the hind wings are paler, and have five transverse zigzag lines, four of which are perceptible only on the inner margin, the fifth or outer one is very distinct.

The caterpillar is pointed at the tail, the anal claspers are absent. There are two prominent and distant papillæ or nipple-shaped warts on the back of the third, fourth, fifth, and sixth segments; those on

the fifth segment are smaller and shorter than the others; those on the third and fourth segments are sesquialterous, that is, they have a smaller papilla adjoining them on the outer side; the papillæ are crowned with a circle of short brown hairs, and a larger bristle rises from the centre of each circle. The seventh, eighth, ninth, tenth, and eleventh segments have each two minute warts in the place of papillæ; each of these also emits a bristle. The face is gray, the crown gray-green, with two transverse reddish bars; the body is pale green, with testaceous or purplish markings on the mottled back of the sixth and following segments; these markings combine in forming a broad stripe down the middle of the back, the papillæ being of the same colour as the stripe, and being included therein. It feeds on birch (*Betula alba*); doubles over the corner of the birch-leaf, and spins a slight web, in which it changes to a CHRYSALIS. The species is double-brooded; the second brood of caterpillars is full-fed at the end of September.

Mr. Greene, in his *Insect Hunters' Companion*, recommends collectors to examine the leaves of birch-trees when joined together for the chrysalis of this species.

The MOTH appears on the wing in May, and again in August, and is very common in several English counties; and Mr. Birchall informs us it is common in the county Kerry in Ireland. (The scientific name is *Platypteryx falcula*.)



382. The Oak Hook-tip (*Platypteryx hamula*).

382. THE OAK HOOK-TIP.—The antennæ are decidedly pectinated in the male, simple in the female; the fore wings are ample, pointed at the tip and hooked; their colour is raw sienna, shaded to umber-brown on the hind margin below the tip, and traversed by two pale lines, the exterior of which has a large angle projecting towards the hooked tip; between these transverse lines are two nearly circular black discoidal spots placed obliquely transverse. The hind wings of the male are of the same colour as the fore wings, with two approximate paler transverse lines, and two minute discoidal spots. The female differs in being considerably larger, and in having the hind wings fulvous yellow: the head is fulvous yellow; the body brown.

The CATERPILLAR is "grayish-brown; a broad dorsal stripe, greenish-brown on the second, third, fourth, twelfth, and thirteenth segments, yellowish-brown on the others, edged with yellow on each side; the fourth segment with two tubercles on the back. (*Dup.*) It feeds on oak and birch."—*Stainton's Manual*, vol. ii. p. 164.

The MOTH appears on the wing in May and August; it has been taken in the southern and eastern counties of England, but not, so far as I am informed, in Scotland or Ireland. (The scientific name is *Platypteryx hamula*.)



383. The Barred Hook-tip (*Platypteryx unguicula*).

383. THE BARRED HOOK-TIP.—The antennæ are decidedly pectinated in the male, simple in the female; the fore wings are ample, pointed, and slightly hooked; their colour is fulvous-brown, with the hind margin and a median band slightly darker; the median band projects an obtuse angle towards the tip, and contains a very indistinct discoidal spot; the hind wings are of the same colour as the fore wings, and have

the same darker median band: the head, thorax, and body are of the same colour as the wings.

The species is supposed to be double-brooded, a subject on which I am not qualified to express an opinion; all that I can assert positively is that the CATERPILLAR occurs abundantly in August and September, and the moth in May, and that the May moths emerge from the August caterpillars is beyond a question; but the point to be settled is, whether there is an entire round of existence—egg, caterpillar, chrysalis, and perfect insect between May and August, which is a view of the case taken by most Lepidopterists. The EGG is laid on the leaf of beech (*Fagus sylvatica*), especially on those stunted or pollard trees which so abound in Epping Forest. When full-fed, in which state it is found at the end of August, and throughout September, the caterpillar rests in a nearly straight position, but with both extremities slightly raised, and not touching the object on which it rests; when roughly touched, or jerked off with the beating stick, it very frequently hangs by a thread, and thus suspended, begins twirling round and round, at first slowly, and afterwards with great rapidity —a feat I have sometimes seen performed by a slug when suspended by a thread of slime exuded from its own body. The head is manifestly wider than the segments immediately following, prone, slightly notched on the crown, which rises in a very marked manner above that part of the back which is immediately behind the head; the body tapers gradually to the eleventh segment, and thence more suddenly tapers to a point; on the fourth segment are two closely approximate warts placed transversely: every part of the body is beset with minor warts, each of which emits a hair. The colour of the head is pale reddish brown, reticulated with darker brown; the body has its dorsal surface dark umber-brown; there is a pale, almost white, narrow stripe on each side, commencing close to the head, and passing obliquely towards the back, where it unites with a medio-dorsal white V-shaped mark on the sixth segment; the same marking is continued as a pale brown shuttle-shaped dorsal stripe on the seventh, eighth, ninth, and tenth segments, and is intersected throughout by an extremely narrow dark median line: there is a conspicuous and elongate pale spot on each side of the eleventh segment; the dorsal warts on the fourth segment and the anal point are reddish; the ventral area, legs, and claspers are very pale, and have a very obscure tinge of green. It changes to a CHRYSALIS among the leaves in a slight web. The chrysalis is brown, the wing-cases having a greenish tinge.

The MOTH, which, as I have said, seems to be double-brooded, appears on the wing both in May and August. It occurs abundantly in some of the southern English counties, but neither in the north of England, in Scotland, nor in Ireland. (The scientific name is *Platypteryx unguicula.*)



384. The Chinese Character (*Cilix spinula*).

384. THE CHINESE CHARACTER.—When at rest this interesting little moth sits with the inner margin of the wings raised above the body, the costal margin deflected, and the whole roof-like: the antennæ of the male are decidedly pectinated, of the female simple; the tip of the fore wings is not hooked, it is obtuse but scarcely rounded; their colour is snowy-white, with an oblique median smoky band which does not reach the costa, but is very dark brown and conspicuous on the inner margin; in the very centre of the wing, which is traversed of course by the median band, the branched wing-rays are beset with silvery scales, which are thus rendered conspicuous, and are supposed to resemble Chinese letters, whence the name; the hind margin is occupied by a smoke-coloured band, and within this is a semi-double oblique series of seven or eight smoke-coloured lunules, each of which is surrounded with pure white: the hind wings are white with a hind-marginal

series of pale smoke-coloured spots: the head is whitish; the thorax white, with a smoke-coloured blotch in the centre; the body is smoke-coloured — paler on the sides.

The head of the CATERPILLAR has a bifid crown, its divisions being obtuse: the second segment has four minute pointed warts, transversely arranged; the third segment has two larger dorsal warts, placed transversely; the fourth has two still larger dorsal warts, also placed transversely; the eleventh has a transverse dorsal protuberance; and the twelfth a pair of minute dorsal warts, also placed transversely; every wart terminates in a minute bristle: the ventral claspers are eight in number, and situated on the usual segments; the caudal claspers are aborted or soldered together, and form a single terminal and gradually attenuated spine or spike, which never appears to touch the leaf on which the caterpillar is feeding, but to be elevated in the air without occupation; at the base of this spike is a minute wart on each side; the body is altogether rugose, and the skin pitted with small depressions. The colour is dingy-brown, with a narrow median darker dorsal stripe, and numerous rivulet markings, and there is also a pale lateral elevated line on each side of the twelfth segment. It feeds on whitethorn (*Cratægus Oxyacantha*), and is full-fed the first week in July, when it spins a tough gummy cocoon attaching it to a twig of the hawthorn, generally in the axil of one of the thorns, and fastens on the exterior of the cocoon fragments of the still green leaves, in such a manner as to conceal it effectually from sight: in this the CHRYSALIS remains not longer than two or three weeks.

The MOTH appears on the wing in May, and again in August: it is certainly double-brooded, and is generally distributed over England and Ireland. (The scientific name is *Cilix spinula*.)

Haworth unites this moth with the species of *Platypteryx* above described, with which, he justly observes, it agrees in its most singular caterpillar, and disagrees only in wanting the hooked tip to the wings.



385. The Alder Kitten (*Dicranura bicuspis*).

385. THE ALDER KITTEN.—The antennæ of the male are strongly pectinated, those of the female slightly so; the shaft of the antennæ is white, the pectinations black: the fore wings are rather narrow, with a very straight costal margin, and a rounded tip; their colour is white, with a broad transverse dark gray median band, the interior margin of which is nearly straight; the exterior margin is very different in different specimens; in some it is nearly straight, in others it has a wide concave notch; it is always bordered with a black line more or less accompanied with yellow; the boundaries of this band are always distinct and clearly marked; between this band and the base of the wing is a transverse series of five or six black spots; and at the base of the wing is a single black spot; exterior to the band is a small discoidal spot, and beyond this are three slender zigzag dark lines, the outer of which expands on the costa into a large transverse blotch of the same colour as the band; on the hind margin is a series of seven or eight small black spots: the hind wings are nearly white, with a pale smoke-coloured bar near the hind margin and a series of black spots on the margin: the head is whitish; the thorax variegated with black, white, and yellow; the body almost white, with dark gray but ill-defined bands.

The CATERPILLAR rests with the anal extremity elevated: the head is slightly narrower than the second segment: the body is almost uniformly cylindrical, but somewhat humped on the sixth segment, from which it gradually decreases in size to the anal extremity, where it terminates in two long caudal horns directed backwards: the colour of the head is brown; of the

body glaucous green, with a bright and distinct double stripe on each side, which, commencing immediately behind the head, ascends towards the back on the sixth segment, and then, after descending, is continued in a direct line to the base of one of the caudal horns; this stripe is divided throughout, the upper half being pink, the lower half white; the dorsal area has an oblique white streak on each side of each segment; the caudal horns are blackish, tipped with red; the spiracles are yellow; the claspers pale green. The CHRYSALIS is to be found within a compact gummy cocoon on the trunks of alders (*Alnus glutinosa*), and I believe that is the only tree on which the caterpillar feeds: as many as ten of the empty cocoons have passed through my hands, all of them still adhering to a portion of the alder bark. Mr. Greene also says: "I have found the cocoons, empty, I am sorry to say, here on alder; but as yet all my efforts to find one from which the insect had not escaped have been fruitless. The vacant cocoons have been found almost invariably about four feet from the ground and on the north side of the tree. Very rarely the caterpillar spins its cocoon *on* the wood [bark?] and not in the crevices or chinks; of course they (the cocoons) are much more easily detected in the former situation, but I do not remember to have seen it more than once. I think it a good plan to scrape the trunk with the edge of the trowel."

The MOTH appears on the wing in May. At present it seems to be a species of some rarity in this country, but its range is rather extensive. Its principal habitat is the Weald of Sussex. "It has been taken several times at Burton-on-Trent," also in Derbyshire, and even as far north as Lancashire. (The scientific name is *Dicranura bicuspis*.) This species must not be confounded with the *Cerura bicuspis* of English authors, which, together with *Cerura integra* and *C. latifascia* of Stephens, must be referred to my *Dicranura furcula*. It may here be observed that nothing has so constantly retarded the progress of entomology in this country as the intense desire to make new species.



386. The Sallow Kitten (*Dicranura furcula*).

386. THE SALLOW KITTEN. — The antennæ of the male are strongly pectinated, those of the female slightly so; the shaft of the antennæ is white, the pectinations black: the fore wings are rather narrow, with a very straight costa and a rounded tip; their colour is pale gray or whitish gray, with a broad transverse median band of a darker gray; the interior margin of this band is straight, and is bordered by a straight black line, and this is accompanied by a straight yellow line; the exterior margin has a wide concave notch near the costa, and an obtuse angle below the notch; it is bordered by black and yellow like the interior margin, but these colours, and indeed the boundary of the band, almost disappear as the latter gradually slopes towards the anal angle and approaches the inner margin: between the band and the base of the wing is a transverse series of five black spots, and at the base of the wing is a single black spot; exterior to the band is a small circular discoidal spot; and again beyond this are three zigzag black lines, the third expanding into a large transverse dark gray blotch on the costa; on the hind margin itself is a series of eight small circular black spots: the hind wings of the male are white, with an occasional smoke-coloured cloud and a marginal series of black dots: in some of the females the hind wings are white, in others smoky; the marginal black spots are always present: the head and collar are white; the thorax is whitish, with three transverse black bars more or less interspersed with yellow; the body is gray, with smoke-coloured bands.

The EGGS are laid singly on the leaves of several species of the genus *Salix*, more particularly those called sallows (*Salix caprœa* and *S. cinerea*): the young cater-

pillar emerges about the 1st of July, and may be found feeding throughout the month; it rests on the upper surface of a leaf, with the ventral claspers attached to a silken pad, previously spun, apparently with this object; both extremities are slightly elevated, the posterior more than the anterior. The head is decidedly narrower than the second segment, into which it is received, and by the anterior margin of which it is almost entirely concealed; the face is flat; the second segment is dorsally flattened, the flattened portion being slightly dilated and squarely truncate, the truncature terminating on each side in an obtuse angle; the third segment has a narrow portion dorsally flattened and elevated posteriorly into a narrow transverse ridge; the eleventh, twelfth, and thirteenth segments gradually diminish into a conical mass, at the apex of which are two cylindrical tubes nearly parallel, closely approximate, and directed backwards; they are beset both above and beneath with short stiff bristles, and each emits a slender drooping filament from the extremity: the colour of the head is pearly-gray, tinged with purple; the dorsal area of the body is divided from the lateral area by a distinct white stripe, which is absent only from the eighth segment; this stripe commences on each side on the second segment, at the angles already described, ascends obliquely to the dorsal ridge on the third segment, descends obliquely to the spiracle on the seventh segment, is lost and confused on the eighth, re-appears on the ninth, and is continued thence to the extremity of the anal flap; on the upper margin of this white stripe, and immediately adjoining it, is a delicate purple stripe, and within this the dorsal area is white, with a median grass-green stripe, and there is also an oblique grass-green stripe on each side of the seventh, eighth, ninth, tenth, and eleventh segments; the lateral surface is apple-green, adorned with numerous roundish purple spots, each ocellated with a central white dot, and enclosed in a white ring; in addition to these are other larger and amorphous purple spots, possessing the white margin, but wanting the central dot; the second segment has on each side in front a large purple-brown blotch, bordered exteriorly with yellow; and on each side of the seventh and eighth segments are obscure orange patches; the legs are principally purple; the ventral claspers are apple-green, with a purple, V-shaped, white-margined mark descending into each; the ventral surface is apple-green; the anal horns are nearly white above, with a tendency to purple, and have a white ring at the tip. When full-fed the caterpillar spins a glutinous cocoon on the bark of the sallow, often towards the bottom of the stem, from one to three feet from the ground, and therein changes to a CHRYSALIS, in which state it passes the winter.

The MOTH appears in June, and is generally distributed throughout the United Kingdom. (The scientific name is *Dicranura furcula.*)



387. The Poplar Kitten (*Dicranura bifida*).

387. THE POPLAR KITTEN.—The antennæ of the male are strongly pectinated, those of the female slightly so; the shaft is white, the pectinations black; the fore wings are rather narrow, straight on the costa, and rounded at the tip; their colour is pale gray, with a broad transverse median band of a darker gray; the internal margin of this band is straight, and bordered with a straight black line, which is accompanied by a straight yellow line; the exterior margin is slightly concave about the middle, and is bordered with black and yellow like the interior margin; but these colours, and, indeed, the boundary line altogether becomes less distinct towards the inner margin: between this band and the base of the wing is a transverse series of five black spots, and at the base of the wing is a single black spot: exterior to the band is a

small circular discoidal spot, and again beyond this are certain zigzag blackish lines, the outer of which expands into a large transverse dark gray blotch on the costa; on the margin itself is a series of eight small circular black spots: the hind wings of the male are white, with an occasional smoke-coloured cloud and a marginal series of black dots; in both sexes, but particularly the female, they have occasionally a broadish smoke-coloured hind-marginal band, terminating in a diffuse spot at the anal angle. The head and collar are white; the thorax whitish, varied with smoky-black; the body gray, with smoke-coloured bands.

The EGGS are laid separately on the upper surface of the leaves of aspen (*Populus tremula*), the female selecting those dwarf shrubby plants which grow in woods; and in gardens on the leaves of tacamahac (*Populus balsamifera*), about the 1st of July, and the young CATERPILLAR emerges about the 14th; it appears to be full-grown about the 26th. It spins a silky coating near the middle of the leaf of its food-plant, and, attaching itself to this, both by its feet and claspers, it is very difficult to remove; it remains perfectly without motion during the day, exposed to the rays of the sun, and feeds during the night. After feeding it sometimes remains clasping the margin of the leaf it has been eating; when at rest the head is nearly withdrawn into the second segment. The eleventh, twelfth, and thirteenth segments are elevated, and the anal horns are closely approximate and pointing in a straight line backwards; the head is prone, and narrower than the second segment into which it is received; the body rises from the head to the fourth segment, which is produced into a transverse dorsal ridge, whence the body gradually tapers to the anal extremity, the eleventh, twelfth, and thirteenth segments forming a cone; at the anal extremity are two cylindrical tubes, each of which is covered with short bristles, which give it a scabrous feel as well as appearance; and each of which also contains a slender filament capable of being protruded at the will of the caterpillar. The colour of the head is grayish-brown, the sides dark brown, the face delicately reticulated; the dorsal area of the body is gray-brown, marbled with darker and lighter shades, and bordered throughout with bright yellow; the lateral and ventral areas are bright apple-green, dotted with purple-brown, and every dot emitting a small black bristle. On the fifth segment the green colour extends completely round the caterpillar, interrupting the dorsal brown area, which recommences in a point and increases in breadth to the eighth segment, on which it descends below the spiracle; it then gradually narrows to the twelfth segment, and again expands on the thirteenth. The anal tubes are green, with a brown patch on the inner side of each near the base; they have a brown ring beyond the middle, and a second paler ring at the tip; the filaments are black, the spiracles brown; the ventral surface of the segments is blotched with brown; the legs are green, each joint having a red mark on the outside. When full-fed this caterpillar excavates a portion of the bark of the tree on which it feeds, and in this constructs a very strong glutinous cocoon, so like the bark in colour as to be seen with difficulty.

The MOTH appears on the wing in June, and is very widely distributed in England; and Mr. Birchall says it is not uncommon, and is widely distributed in Ireland. (The scientific name is *Dicranura bifida*, and this name also includes *Cerura arcuata* and *C. fuscinula* of Stephens.)

Obs.—Notwithstanding the perfect conviction I feel that *Dicranura furcula* and *D. bifida* are distinct species, I am bound to acknowledge my inability to make the difference apparent in words. The exterior margin of the median band in *D. furcula* is generally more concave or scooped out below the costa than in *D. bifida;* the median band is darker coloured in *bifida*, it is more inclined to orange in *furcula; bifida* is also a larger insect; but these are comparative differences only, and therefore we must appeal to the differences in food and colour of the caterpillars, when all doubt of the distinctness of the species will be at once removed.



388. The Puss Moth (*Dicranura vinula*).

388. THE PUSS MOTH.—The antennæ are pectinated in both sexes, but much more strongly so in the male; the fore wings are rounded at the tip, their colour is gray, with very numerous darker markings, some of which—those nearest the base and costal margin—are generally short, transverse, and bounded by the wing-rays; some of them, however, unite in forming an obscure transverse band near the base of the wing; still nearer the base is a transverse series of five or six black spots, and there are one or two others at the very base; the principal wing-rays are denuded of scales, and therefore appear yellowish, but the parallel rays, extending to the hind margin, are clothed with black scales; there is a distinct crescent-shaped discoidal spot, between which and the hind margin are several deeply zigzag smoke-coloured lines; on the hind margin are nine or ten distinct smoke-coloured streaks, alternating with the wing-rays, and terminating in black marginal dots: the hind wings are snowy-white at the base, rather smoke-coloured in the disc; they have a faint discoidal spot, and four or five dark spots in the fringe: the head is white, the thorax nearly white, with eight intensely-black spots the body is whitish-gray, with transverse smoke-coloured markings. The female is much larger than the male, and has the wings and body considerably darker.

The EGGS are laid on the leaves of willows and poplars, and the young larvæ when they emerge from the egg-shell are almost black, and have two processes, something like ears, standing out from the front of the second segment, one on each side of the head; as the caterpillars increase in size, these little ears gradually decrease in relative magnitude, and at length merge in the black spots adjoining the head, which are presently to be described. The full-grown CATERPILLAR rests with its flat head drawn into the second segment, and its anterior segments elevated; the body is quite smooth, the dorsal outline rising to a pointed hump on the fourth segment, then falling to the sixth segment, then of uniform substance to the ninth, and thence the body is rapidly attenuated to the thirteenth, which terminates in two horns covered with scabrous points, each emitting, when the caterpillar is irritated, a slender, pink, drooping filament; the head is pale brown in front, and black at the sides; the recess into which the head is withdrawn is

pink, with a large black spot on each side; the body has a white lateral stripe, ascending obliquely from each side of the head to the apex of the hump, then descending obliquely to below the spiracle on the eighth segment, then again ascending elliptically, and terminating at the base of the anal horns; above this white stripe the body is whitish, longitudinally striated with purple-brown, the white predominating along the median line, the purple-brown predominating in the vicinity of the lateral white stripe; below this white stripe the body is yellow-green, with the exception of a nearly round purple-brown blotch, just above the clasper on the eighth segment: this blotch, not always present, is bordered above with white: the legs are yellow-green, with a black ring at the base, and black tips; the eight ventral claspers are green, the two horn-like anal tubes whitish, with black scabrosities. It feeds on several varieties of narrow-leaved willow (*Salix*), is full-fed in July, when it crawls down the stem of the willow to within two, three, or four feet of the ground, then gnaws out the bark, and spins an extremely tough, gluey cocoon in the excavation thus made; in this gluey cocoon it changes to a CHRYSALIS, and remains in that state all the winter.

The MOTH appears on the wing in May and June, and is common in England, Scotland, and Ireland. (The scientific name is *Dicranura vinula*.)

Obs. 1. A correspondent of the *Zoologist*, who seems to have enjoyed considerable opportunities of rearing these caterpillars, and of observing their manners in confinement, has published the following particulars in that journal:—

"Having reared a pretty considerable number of the caterpillars of the Puss-moth during the present season, I have ventured to put upon record a few observations respecting their habits. A good number of them were reared from the egg. The earliest eggs were found from the beginning of June to the 14th September, and I took young caterpillars as late as the middle of August, some of which have not yet completed their growth, so that the life of the caterpillar extends from June to September. The markings on the back, it is well known, vary slightly in different individuals; I have yet to ascertain whether these are distinctive of the sexes. Besides this there is one variety, distinguishable even from the egg, which is pink instead of red. From these lighter eggs the caterpillars produced have, throughout their earliest stages, a reddish tint in those parts of the body where the other specimens are black; and after the last change of skin they are lighter than the others, both in the ground colour and the shadings. These caterpillars were fed both on willow and poplar, but the poplar seemed to be the most congenial food, and the largest in growth were fed exclusively upon it. They were supplied with fresh leaves twice a day, at 8 A.M. and 6 P.M., and really appeared to manifest some dim consciousness of the approach of feeding time, even when their stock of food was not exhausted, although they certainly did not display the restless agitation which the accustomed hour provokes in the captive Carnivora. At each successive change of skin the caterpillar devours the cast-off garment, with the exception of the head, which seems too tough a morsel. The time occupied by each change is usually four days, and the caterpillar eats nothing for about half-a-day after it is completed, saving the old skin. These caterpillars are remarkably pugnacious after they have changed their skins for the last time, the approach of an observer immediately occasioning the protrusion of the tentacula or filamentous horns. As they increase in size, they become more pacific. These caterpillars have, as most entomologists have observed, the power of ejecting a fluid in defence when annoyed or irritated. Old writers on Natural History state that this fluid is thrown from a rose-coloured aperture behind the head. On the contrary, the aperture is below the head, extending, when the caterpillars are full-grown, transversely about two lines, just beneath the chin, if one might so call it. Rennie says that this power of ejection is lost when the caterpillars are removed from their parent

tree. This is the case with most, but singularly enough not with all; three of those I had were exceptions to this rule. This liquid is of an acrimonious nature, probably containing an acid. A large proportion of my caterpillars lost one or both of their 'horns' or 'tail appendages' from a curious cause. They appear to be reckoned tit-bits by some individuals, and when they could do so successfully they employed their jaws in nibbling off the posterior ornaments of their companions. This strange propensity was not occasioned by any scarcity of their accustomed food. The caterpillars, however, when awake, are peculiarly sensitive to any attacks of this kind, and I noticed that these approaches were only successful at times when the individual attacked was in a state of repose. I use the word 'awake' advisedly, for, from my observations made upon many species of lepidopterous caterpillars, I feel convinced that they do sleep at times, or something very nearly analogous to it. This same propensity manifested itself in a brood of *Smerinthus ocellatus*, half of which had the posterior horn nibbled off. When the caterpillars of the Puss-moth are about to cease eating and form their cocoons, the whole ground colour changes to a dull brown. I was anxious to ascertain whether any two of the caterpillars, who were seeking at the same time for a convenient spot to form their cocoons, would unite and form a common one, as sometimes occurs with the silk-producing caterpillars: no such instance occurred. They seemed, however, fond of forming their cocoons upon those of their predecessors. In one corner of a box I have no less than six clustered together. Several of them ornamented their cocoons by interweaving some of the excreta or 'caterpillar's pills,' as a juvenile friend calls them, thus presenting rather an odd appearance when finished." These statements have been fully corroborated by several writers in the *Entomologist* during the past year, especially as regards the cannibalistic propensity to devour each others' tails. The sources or original reservoir of the moistening fluid, together with the mode of its expulsion and the chemical properties, if any, of the fluid itself, are subjects well worthy of careful investigation; a minute investigation of the caudal horns and their contained thread-like appendages would also abundantly repay the little expenditure of time and trouble needful to obtain satisfactory results.



389. The Lobster (*Stauropus Fagi*).

389. The Lobster.—The antennæ are strongly pectinated in the male, from the base to near the extremity, which is quite simple and thread-like; in the female they

are simple throughout: the fore wings are arched towards the tip, but not pointed; their colour is smoky-brown, with a large pale gray blotch at the base, and within this blotch, close to the body, is a small black spot; towards the hind margin the wings are also paler, and the central portion is bounded on each side by a zigzag pale line, which gives it the appearance of a median band; between the outer of these pale lines and the hind margin is a series of six blackish spots, each accompanied by a pale spot on its inner side; five of these double spots are ranged in a row parallel with the hind margin, but the first or uppermost is nearer the median band; the inner margin, more especially in the male, is tinged with rust colour: the hind wings are uniform gray-brown, in some specimens having a median waved whitish line: the head and thorax are gray-brown; the body generally paler, except towards the extremity, which in some specimens is almost white, and the scales on this part are always long and hair-like.

The CATERPILLAR does not roll in a ring, or feign death when disturbed; when at rest, it throws back its head so as entirely to hide the second, third, and fourth segments; the head being quite equal in bulk to these three segments if united; the posterior segments are at the same time elevated in an extraordinary manner; the first pair of legs is of moderate size, the second and third pairs have the femora and tibiæ extremely lengthened; the body is deeply incised at the division of the segments; the fifth, sixth, seventh, eighth, ninth, and tenth segments have each of them two humps,—those on the fifth, sixth, and seventh are the largest and of equal size, the others gradually decreasing in magnitude; the eleventh, twelfth, and thirteenth segments are without humps; the eleventh segment has a narrow, flattened, crenulated, lateral margin; the twelfth has a much more extensive margin, having the same characters; the thirteenth segment terminates in two erect, stiff, slightly clavate, slightly curved, appendages or horns. The colour is testaceous-brown, covered throughout with pale points like shagreen; there are two interrupted, slender, black stripes down the back, and a paler median stripe between them; there are, moreover, several slender black markings on both sides of the caterpillar. This singular caterpillar, which is known to collectors as "The Lobster," feeds on oak (*Quercus Robur*) and birch (*Betula alba*), and is full-fed about the 25th of September; it then spins together two or three oak-leaves, and makes a retreat wherein to form its cocoon; in this it changes to a CHRYSALIS, and when the united leaves fall on the approach of winter, they form a kind of parachute, which conveys the chrysalis gently and safely to the ground, where it remains throughout the winter.

The MOTH appears on the wing in June; it has occurred only in the southern and eastern counties of England,—Essex, Kent, Surrey, Sussex, Hampshire, Devonshire, and once, according to Mr. Greene's "Insect Hunter's Companion," at Halton, in Buckinghamshire. The London district would seem to be its chief resort; Epping, West Wickham, Birch, and Darenth, are noted localities. (The scientific name is *Stauropus Fagi*.)



390. The Sprawler (*Petasia cassinea*).

390. THE SPRAWLER.—The antennæ are very decidedly pectinated in the male, simple in the female; the fore wings are narrow, and have the costal margin remarkably straight, the tip neither pointed nor rounded: their colour is wainscot-brown, with several distinct longitudinal umber-brown streaks, the most conspicuous of which originates at the middle of the basal margin: the hind wings are pale gray, with the discoidal spot and wing-rays decidedly darker; on the extreme hind margin is a series of dark brown markings: the head, thorax, and body are gray-brown;

the thorax has a dark streak on each side at the base of the wing.

The CATERPILLAR rests in nearly a straight position, with all the claspers attached to the food-plant: the head is rather narrower than the second segment, the body is nearly uniformly cylindrical as far as the twelfth segment, which is perhaps the deepest of any, being dorsally produced into a kind of hump; the colour of the head is dull olive-green, that of the body yellowish green, but of different shades in different individuals, some inclining to glaucous: it has a narrow yellowish-white collar and five narrow whitish stripes; one of these is medio-dorsal, and extends from immediately behind the head to the extremity of the anal flap: another on each side runs from immediately behind the head below the spiracles; this is tinged with yellow and bordered above by a delicate dark brown line: the spiracles are white, each surrounded by a black ring which touches the dark line I have just described; exactly intermediate between the medio-dorsal and lateral line is a slender white line which begins on the fifth segment, runs straight from thence to the tenth segment, and then turns upwards towards the medio-dorsal stripe, which it nearly touches on the twelfth segment; it then again descends towards the anal extremity, where all the stripes meet. It feeds on oak (*Quercus Robur*), from which tree I have repeatedly beaten it in June; it falls into the umbrella with its feet sprawled out as wide as possible, whence perhaps the name of the moth; in confinement it is a perfect cannibal, devouring its companion caterpillars without mercy. When full-fed, it buries itself in the earth as deep as the breeding cage will allow, and changes to a smooth brown CHRYSALIS.

The MOTH appears on the wing in October, and has occurred in several English counties both north and south. The males, probably from their being more volatile, are much more frequently taken than the females, which are very rarely indeed, if at all, procured otherwise than by rearing from the caterpillar. (The scientific name is *Petasia cassinea*.)



391. The Rannoch Sprawler (*Petasia nubeculosa*).

391. THE RANNOCH SPRAWLER. — The antennæ of the males are decidedly pectinated, those of the female simple: the fore wings are rather narrow, the costal margin straight and the tip obtuse; their colour is rich bistre-brown with paler markings, the principal of which are a large reniform stigmoidal spot, a short interrupted basal line, a transverse zigzag line beyond the middle, and a marginal zigzag line; the hind wings are smoky-brown with a darker discoidal spot, darker wing-rays, and a continuous series of darker hind-marginal dots: the head, thorax, and body are bistre-brown, and densely clothed with long loose down.

The EGG is laid about the middle of April, either on the slender twigs or young leaves of the birch, and is hatched about the 1st of May. The caterpillar rests in the form of a horseshoe, the head thrown back until it nearly touches the elevation on the twelfth segment; when in this position, it often adheres by three pairs of claspers only, the first and fifth pairs being raised: it does not fall off its food, feign death, or roll itself in a ring when touched or disturbed. The head is of slightly less diameter than the body, and is susceptible of being partially withdrawn into the second segment; the body is of uniform diameter throughout, the twelfth segment being elevated on the back into an obtuse angle; the divisions of the segments are marked by conspicuous incisions. The head is shining glaucous or blue-green; the body is delicate apple-green, with a narrow, transverse, oblique yellow stripe on each side of the fourth segment; on the back of each segment from the fifth to the tenth, both inclusive, is a whitish cloud, and on

each side of each segment a faint indication of a similar whitish cloud; on the summit of the elevation on the twelfth segment is a narrow transverse line, bright yellow at both extremities, but paler in the middle; on each side of each segment also are ten raised dots: the two that most nearly approach the median line of the back are yellow, and each emits a single black bristle: then follows a longitudinal series of three white dots, and then a single yellow dot emitting a black bristle, and below this yellow dot is a spiracle, oblong, white, and black-margined; anterior to the spiracle and in a line therewith are two white dots, and posterior to these one yellow dot emitting a black bristle and one white dot; behind the last spiracle, and extending along the edge of the anal flap, is a bent white line, in which are two conspicuous yellow dots, larger than either of those previously mentioned: the legs are rather long, green tinged with red-brown; the claspers are apple-green, with a shield-shaped mark in black outline on each. It feeds on birch (*Betula alba*), and is full-fed rather before the middle of June, when it measures rather more than two inches in length; it then goes into the earth, concealing itself just beneath the surface.

The MOTH appears at the end of March or the beginning of April, and, as far as the British Isles are concerned, has hitherto been found only at Rannoch, in Scotland. In confinement it rarely attains the perfect state, most commonly dying as soon as full-fed. (The scientific name is *Petasia nubeculosa*.)



392. The Buff-tip (*Pygæra bucephala*).

392. THE BUFF-TIP.—The antennæ are serrated in the male, simple in the female: the fore wings have the costal margin straight, the tip obtuse but not rounded; when at rest, the wings are wrapped round the body, which thus acquires something the appearance of a cylinder cut off at both ends; their colour is pearly-gray, inclining to purple-gray towards the costal margin, and to silvery-gray at the base, and along the inner margin; there is a slender transverse brown line very near the base, and near this is a transverse bar composed of three lines, the middle one sienna-brown, the outer ones umber-brown; a second bar coloured in a similar manner originates almost at the tip of the wing, makes a semicircular curve inwards, and then descends in an obtusely zigzag manner to the inner margin; the space enclosed between these two bars contains a pale reniform stigmoidal spot, and very numerous short waved transverse streaks; the tip of the wing is occupied by a large ochreous blotch; the hind margin is notched and has a triple marginal bar coloured like the transverse bars already described; the hind wings are yellowish white with a slightly darker cloud across the middle; the head is ochreous; the thorax ochreous, with a double brown line on each side and behind; the body is dingy ochreous.

At the beginning of June these singular moths may be frequently found coupled in pairs on the trunks of lime, elm, and other trees, or on the herbage below them; the

truncate heads and closely convolute wings giving each pair the appearance of a single piece of dead and dried stick. As soon as they separate the EGGS are laid in a patch of thirty to sixty, mostly on the upper side of a leaf; they are convex above and flat beneath, of a china-white colour above, and smoke-colour beneath, and having, in the middle of the convex portion, a very conspicuous black dot; the young CATERPILLARS emerge in fourteen days, and, after eating a portion of the egg-shell around the point of emergence, they feed in company on the upper cuticle and the parenchyma of the leaf, leaving the veins entire and connected by the lower cuticle: they have then large shining black heads, and much narrower yellow bodies beset with long soft hairs, and adorned with series of black spots or blotches, of which the medio-dorsal series is by far the most conspicuous, the lateral series consisting of minute and inconspicuous spots; the dorsal surface of the second segment as well as the whole of the thirteenth segment is black, as are also the anal claspers, which are constantly elevated, rarely touching the leaf on which the little creatures are standing: after eight days they undergo the first moult, and then separate into little companies of six, eight, or ten, each company ascending to the tip of a leaf, and feeding at the edge in the usual manner; but when resting, each little company huddles together on the surface of the leaf, reposing side by side with the anal claspers elevated: the head is now still more largely developed, much broader than the body, and shining black; the dorsal surface of the second and thirteenth segments is still black; after a second moult, the head is less conspicuously large, and the body more variegated: as the caterpillar continues to grow, the markings develop themselves, and the head and body become covered with soft, flexible, and rather longish hairs. The caterpillars are full-fed towards the end of July, and are readily found by the devastation they cause: each brood fixes on some topmost outside branch of elm (*Ulmus campestris*) lime (*Tilia europæa*), hazel (*Corylus avellana*), or other tree (for this species appears a very general feeder), and, completely stripping off the foliage, leaves the twigs as bare as in the depth of winter: these voracious colonies are seldom within reach of the hand, but if a stick be thrown up the caterpillars descend in a perfect shower: they are extremely flaccid, and never roll in a ring, but almost immediately on regaining their legs turn their heads towards the trunk of the tree whence they have been shaken, and reascend, traversing the branches and twigs until they attain an elevation and exposure satisfactory to their minds. The head of the full-fed caterpillar is prone, exserted, and of nearly the same width as the body; it is covered with crowded but minute punctures, and with fine silky hairs; the body is uniformly cylindrical, clothed with very fine silky hairs, and having a glabrous corneous plate on the thirteenth segment, which decreases in size after each moult. The colour of the head is black, with a bright yellow mark on the face in the form of a letter V reversed: the base of the antenal papillæ is also yellow: the colour of the body is dull yellow, with a transverse band about the middle of each segment of a deeper colour, almost orange; and on each side, alternating with these orange bands, which occupy the verrucose portions of the surface already noticed, is a series of obscure and ill-defined markings, almost white; there are also nine longitudinal black stripes extending from the third to the twelfth segment, both inclusive; these stripes are interrupted throughout by small circular yellowish dots, each of which has a minute central black dot, emitting a white hair; of these nine stripes the medio-dorsal is somewhat the broadest, and decidedly the most conspicuous; between the third and fourth lateral stripes are the intensely black spiracles; there is also a glabrous corneous black plate occupying the anal flap; the legs are intensely black and shining, and have dull blackish markings above their base; the ventral claspers have a black shining exterior corneous plate, and smoke-coloured markings on the outer surface; the anal claspers are black and still elevated when at rest; the belly is yellow, with two series of black blotches between the fourth

pair of ventral and the anal claspers. These caterpillars having arrived at their full-fed condition, descend the trunks or stems of the trees on which they have fed, and crawl about the surface of the ground with great activity, often crossing dusty roads and leaving long circuitous tracks in the dust; sometimes marching over flagged pathways, and being consequently trodden under foot of man, by which casualty hundreds come to an untimely end; those which escape nestle at the roots of herbage or under fallen leaves, and change to CHRYSALIDS on the surface of the earth, without any web, cocoon, or protection of any kind, and with so little attempt at concealment, that they are frequently seen by the passing entomologist, and are sometimes in such abundance that boys collect them to sell to dealers in entomological specimens at a penny or twopence a dozen: they also constitute a favourite food of poultry, and are sought for with great eagerness; Dame Partlet may often be seen scratching for them in my own neighbourhood under the lindens. The chrysalis is regularly punctuate, but slightly shining: its colour is very dark brown; a deep dorsal notch divides the twelfth and thirteenth segments; the latter terminates in two very singular processes, each of which is furcate, the prongs divaricating and acutely pointed.

The MOTH appears in June, and is abundant in many parts of England and Ireland. (The scientific name is *Pygæra bucephala*.)



393. The Chocolate-tip (*Clostera curtula*).

393. THE CHOCOLATE-TIP.—The antennæ are moderately pectinated in the male, very slightly so in the female: the fore wings have the costal margin straight, the tip obtuse; their colour is brownish-gray with a tinge of pink, except at the tip, which is occupied by a very large, bright, chestnut-coloured blotch; each wing is traversed by five transverse bars, the first, second, and fourth of which, counting from the base, are very distinct, and almost direct; they are white or ochreous-white, with darker borders, the third is less distinct and less complete; it is imperfect at both extremities, at its lower extremity not quite reaching the inner margin, and at its upper extremity bending towards and uniting with the fourth, before it reaches the costal margin; the fifth is little more than a transverse series of irregular dots: it intersects the apical blotch, cutting it into two almost equal but irregular sections: the hind wings are gray-brown; the head is gray-brown; the thorax is gray-brown; with a cordate median umber-brown blotch, the smaller end being directed backwards, prolonged and pointed; the body is gray-brown, the extremity umber-brown and spreading.

The EGGS of the first brood are usually laid during the month of April, on the common aspen (*Populus tremula*), and other species of poplar. When hatched, the young CATERPILLARS associate in companies, spin together the leaves of the food-plant without altering their perfectly flat position, and reside entirely in the domicile thus formed, eating only the upper cuticle and parenchyma of the lower of the two leaves of which their dwelling is composed, and leaving the ribs as it were skeletonized, yet connected together by the lower cuticle. When the leaves forming this dwelling are separated, each caterpillar leaves its domicile at night to feed, and returns to it before morning. The head is rather wider than the body, which is somewhat depressed in form, but of nearly uniform substance throughout; there is a dorsal hump on the fifth and another on the twelfth segment; each segment, except the second, which has but a single wart on each side, has also a transverse series of six warts of nearly uniform size, besides a minute wart just behind the spiracle on the fifth, sixth, seventh, eighth, and twelfth segments; on the ninth, tenth, and eleventh segments

there are two warts below the spiracle instead of one; all the warts emit silky hairs: at this period the head is black, the body opaque black, with a broad pale yellow median stripe, which is composed of four narrow approximate stripes, and is interrupted on the fifth and twelfth segments by the dorsal humps, which are black; all the warts are pale yellow: the belly, anal flap, and anal claspers are smoke-coloured, with a tinge of pink; the legs black; the ventral claspers smoke-coloured. After the last ecdysis, which takes place in May, the caterpillar leaves its domicile, rarely returning to it, and its appearance is greatly altered; the black dorsal humps remain, the warts and hairs remain; the warts are orange-red, the hairs nearly white; the whole body with these exceptions is reddish-gray, spotted with black; the body having greatly increased in size is now wider than the head, which is black only on the sides, having a red stripe down the face, a black clypeus and a white labrum: it still spins together the leaves of its food-plant, the lower usually remaining flat, while the upper is raised into a manifest convexity; in this retreat it changes to a CHRYSALIS of a dark-brown colour, and rounded at the anal extremity.

The MOTH appears on the wing in April and July, the chrysalis producing the April brood remains in that state throughout the winter. It occurs in the caterpillar state in our northern, midland, and southern counties, and also near Clonmel, in Ireland. (The scientific name is *Clostera curtula*.)



394. The Scarce Chocolate-tip (*Clostera anachoreta*).

394. THE SCARCE CHOCOLATE-TIP.—The antennæ are moderately pectinated in the male, very slightly in the female; the fore wings have the costal margin straight, and the tip obtuse; their colour is brownish-gray, with a tinge of pink, except the tip, which is occupied by a very large purple-brown blotch; each wing is traversed by five transverse bars, the first and second of which are indistinct, but almost direct; the third is waved, and very indistinct; all the three are composed of a lighter and a darker line; the fourth is sinuous; it intersects the apical blotch, and is there pure white, and very distinct, but below the apical blotch it is comparatively faint; the fifth is little more than a transverse series of irregular dots; near the anal angle of the wing is an almost circular black spot, with one or two minor black spots below it: the hind wings are gray-brown; the head is gray-brown, with an umber-brown crown; the thorax is gray-brown, with a broad longitudinal stripe of umber-brown; the body is gray-brown, the extremity rather dark and tufted.

The CATERPILLAR does not roll in a ring, or fall from its food-plant, or feign death when disturbed; the body is slightly depressed, and has a double skin-fold, extending its entire length, on each side, in the region of the spiracles; it has a prominent median hump on the back of the fifth segment, and a second but less prominent median hump on the back of the twelfth segment. The head is black, slightly shining, and beset with chestnut-coloured hairs: the body is velvety black, mottled and reticulated with smoky-gray; there is a broad median stripe of dingy white down the back; this stripe is composed of square median markings, which are situated respectively on the fourth, sixth, seventh, eighth, ninth, tenth, and eleventh segments; that on the fourth segment is isolated, but not so clearly defined as the others, which are strung together by four parallel whitish lines, situated in the interstices of the segments; these connecting lines are especially observable when the caterpillar is crawling: the humps on the fifth and twelfth segments are bright chestnut-brown; that on the fifth emits a few longish chestnut-brown hairs; and there is a series of markings of a similar colour along each side on the elevations of the skin-folds, both above and below the

spiracles; the fifth segment is entirely without the median white mark, its site being occupied by the chestnut-brown hump, and on each side of this is a somewhat square spot of snowy whiteness, and entirely surrounded with intense velvety black; on each side of each of the square white dorsal markings is also a squarish spot of intense velvety black: the back of the second, third, and thirteenth segments has a transverse series of small chestnut-coloured prominences, emitting chestnut-coloured hairs; the belly is pale smoky-gray; the legs black; the claspers are smoky flesh-coloured. This beautiful caterpillar was first found by my friend, Mr. Sidney Cooper, at Folkestone, feeding, as he believes, on sallow (*Salix caprœa*); afterwards by Dr. Knaggs, feeding on poplar (*Populus nigra?*). The caterpillars spun up between leaves about the middle of July, and therein changed to CHRYSALIDS.

The MOTH, like the preceding, is rarely found in the perfect state. There is, or was, a specimen in the British Museum, and it is described both by Haworth and Stephens as a British insect; it has been bred so abundantly from the caterpillars found at Folkestone that it now abounds in all our cabinets. (The scientific name is *Clostera anachoreta.*)



395. The Small Chocolate-tip (*Clostera reclusa*).

395. THE SMALL CHOCOLATE-TIP.—The antennæ are decidedly pectinated in the male, but almost simple in the female; the fore wings have the costal margin straight, the tip almost square; their colour is purple-gray at the base, brown-gray and darker towards the hind margin; each wing is traversed by four pale transverse lines, the first and second of these are united just before they reach the costa, and again just before they reach the inner margin; the third is bent before reaching the costal margin, and then turns downwards and outwards, meeting and uniting with the fourth; it also again unites with the fourth near the inner margin; the fourth is nearly direct; it commences on the costa in a conspicuous crescentic white spot; the hind wings are dark brown-gray; the head is gray, with an umber-brown crown; the thorax is gray, with an umber-brown median longitudinal stripe, which divides at the lower end, the branches extending to each side at the junction of thorax and body, which latter is gray, and has a slight tuft at the extremity.

The head of the CATERPILLAR is black; the body has a very broad median gray stripe down the back, in which stripe is a central tubercular velvety spot on the fifth, and another on the twelfth segment; this stripe also contains yellow transverse markings, which are very distinct on the third, fourth, and sixth segments: on each side of the gray median stripe is a broad, lateral, smoke-coloured stripe; the belly, legs, and claspers are also smoke-coloured, and between the smoke-colour of the lateral stripe and that of the belly is a narrower stripe, composed of black and yellow spots and dots, and including the spiracles: the entire body of the caterpillar is slightly hairy. It feeds exclusively on dwarf sallows (*Salix caprœa* and *S. cinerea*), and is double-brooded; the first brood is full-fed about the 5th of July, the second at the end of September; then spinning a web amongst the leaves of its food-plant, and turning to chrysalis in the retreat thus fabricated, it remains in that state throughout the winter.

The MOTH appears on the wing in May and August. I have received it from Brighton, Saffron Walden, Ipswich, and Cockermouth, and I believe it is widely and generally distributed both in England and Ireland. (The scientific name is *Clostera reclusa.*)



396. The Dusky-marbled Brown (*Gluphisia crenata*).

396. The Dusky-marbled Brown.—The antennæ of the male are strongly pectinated, those of the female slightly so; there is no tuft of scales at their base, the fore wings are blunt at the tip, the hind margin almost straight, the inner margin has no angle or tuft, their colour is dingy-brown with a gray transverse line accompanied exteriorly by a dark line before the middle; beyond the middle is a similar gray line with a similar accompaniment, but conspicuous only on the inner margin; beyond and parallel with the hind margin is a pale zigzag bar very imperfectly developed: the hind wings are dingy-brown; the head, thorax, and body are dingy-brown.

"The caterpillar is pale green, the dorsal line spotted with ferruginous, bordered on each side by a yellow line. (*Dup.*) On poplar." *Stainton's Manual*, vol. i., p. 122.

The moth appears on the wing in June. Three specimens have been taken at Epping, and I believe nowhere else in Great Britain. (The scientific name is *Gluphisia crenata.*)



397. The Plumed Prominent (*Ptilophora plumigera*).

397. The Plumed Prominent.—The antennæ are beautifully plumose in the male, simple in the female; the fore wings have the costal margin straight, the tip scarcely pointed, and the hind margin slightly scalloped; they are semi-transparent and of a pale raw sienna-brown, with a much-bent interrupted and very indistinct paler transverse bar beyond the middle; the wing-rays are brown, except when they cross the pale bar: the hind wings are rather paler than the fore wings, but the head, thorax, and body are of the same colour as the fore wings.

I am indebted to the Rev. H. Harpur Crewe for the following information:—

The eggs are brown, and laid in the month of November.

The caterpillar is pale whitish-green, the centre of the back is bluish, the subdorsal lines are distinct and white; the spiracular lines pale yellow, slender and waved, two on each side, the lower of each pair becoming broader on the anterior and posterior segments; the segmental divisions are pale yellow, the ventral area is grass-green. It feeds on maple (*Acer campestris*) in shady woods and hedges, generally in chalky districts, and is full-fed at the end of June and beginning of July.

The chrysalis is enclosed in a tight earthen cocoon, rather short and black; rich dark reddish-brown; its thorax and wing-cases are almost black. The extremity of the body is furnished with a bristly bifurcate appendage.

The moth appears on the wing in October, and seems to be of very rare occurrence in this country. My specimens are from Buckinghamshire, but I do not know the exact locality. (The scientific name is *Ptilophora plumigera.*)



398. The Pale Prominent (*Ptilodontis palpina*).

398. The Pale Prominent.—The palpi are very long, pointed, and bent downwards at the tip; the antennæ are strongly pecti-

nated in the male, less so in the female; the fore wings have the costal margin straight, the tip pointed, the hind margin slightly scalloped, and the inner margin with two decided angular projections or lobes; their colour is pale wainscot-brown, with three obscure bands of darker brown; one of these occupies the hind margin and the others are parallel to it at short distances; scattered over the wings are certain black dots and streaks, always seated on the wing-rays: the hind wings are smoky-brown, paler at the base, and have a very pale fringe: the palpi, head, thorax, and body are of the same colour as the fore wings; the body of the male has a split tuft at the extremity.

The CATERPILLAR has rather a small head and the body is without hairs or humps, but rough, with transverse wrinkles. The colour of both head and body is glaucous-green, with six stripes; two of these are slender, white, and tolerably near together, running parallel down the back, each of them being composed of minute, raised, white warts; on each side is a lateral stripe of the same hue, but more slender, less conspicuous, and less evidently composed of warts; and below this on each side, just above the spiracles, is a most distinct yellow stripe, delicately margined above with intense black; on the second and third segments is a little patch of delicate lilac immediately adjoining the yellow stripe; the two dorsal stripes and the yellow spiracular stripes, together with their black margin, extend along the head to the very mouth; but the middle stripe on each side does not enter the head. It feeds on several varieties of willow and sallow (*Salix*), and on more than one species of poplar (*Populus*); and is full-fed at the beginning of October: it spins on the surface of the ground; and remains in the CHRYSALIS state all the winter.

The MOTH appears in June, and is by no means uncommon in England: Mr. Birchall also records it as having been taken by Mr. Bristow, in the county Wicklow, in Ireland. (The scientific name is *Ptilodontis palpina*.)

Obs.—Mr. Greene, in writing of the chrysalis, observes, it is "occasionally found at poplars, but much more frequently at willows, especially when on the banks of ditches and streams. When in such situations, that side of the trunk which faces the stream is often clothed with grassy sods of loose dry friable earth; this is the place for *Palpina*, shake the sod well, and the cocoon, which is grayish and of weak consistency, will generally be found among the dry roots; it is easily distinguished from that of *Dictæa*, being much smaller (*i.e.*, the cocoon), and not so much mixed up with earth. End of September."



399. The Coxcomb Prominent (*Notodonta camelina*).

399. THE COXCOMB PROMINENT.— The palpi are very small and insignificant; the antennæ are slightly pectinated in the male, quite simple in the female: the fore wings have the costa almost straight from the base to the tip, which is pointed; the hind margin is scalloped, and has six points or angles besides the tip; the inner margin has two angular projections or lobes, one small and obscure near the anal angle, the other half way between this and the base, and very prominent; their colour is rather pale brownish rust-colour; in some specimens the brown tint prevails, in others the rust-colour; there is generally a broad darker hind-marginal band, but in some specimens only the inner half of this is perceptible, reducing the band to a mere bar; parallel with this bar is a second oblique bar commencing on the costa, and ending in the large inner-marginal projection; this second bar has an acutely zigzag margin; a slight cloud occupies the site of the usual discoidal spot; the wing-rays are slightly darker than the disk: the hind wings are paler, except towards the hind margin; at the anal angle of each is a very dark blotch interrupted by a rather long transverse pale spot: the head and thorax are nearly of the same colour as the fore

wings; the body of the same colour as the hind wings.

The CATERPILLAR has a greenish head, and the body is uniformly cylindrical to the twelfth segment, which is rather tumid, and has two distinct but approximate warts on its back. The colour is glaucous-green, paler on the back; the warts are tipped with pink, and armed at the tip with a small fascicle of short black bristles; a slender bluish median stripe originates on the back of the third segment, and passes in a direct line to between the pink-tipped warts on the twelfth segment; the back is particularly inclined to white on each side of this median stripe; on each side of the body is a series of white spots, most of which enclose a black spiracle, and behind each white spot, and closely adjoining it, is a pink spot: this series of spots is connected together by a number of slender white lines, and the whole together constitute what might with propriety be called a spiracular stripe. All parts of the body emit scattered black bristles; the head and second segment have more than the following segments; the legs and claspers are pinkish; the belly is distinctly green. It feeds on birch (*Betula alba*), maple (*Acer campestris*), oak (*Quercus robur*), &c., and is usually full-fed in September; it spins a slight cocoon on the surface of the earth, and remains in the CHRYSALIS state all the winter. (*See* fig. 9, p. 203.)

The MOTH seems to have no especial season. I have found it from May to September, and the caterpillar will occasionally fall to the beating-stick as long as the oak remains in leaf. The species is common wherever I have collected in England, and Mr. Birchall informs us it is abundant at Powerscourt and Killarney, in Ireland. (The scientific name is *Notodonta camelina*.)



400. The Maple Prominent (*Notodonta cucullina*).

400. THE MAPLE PROMINENT.—The palpi are small and inconspicuous; the antennæ are slightly pectinated in the male, quite simple in the female: the fore wings have the costa very slightly arched, the tip blunt, the hind margin slightly scalloped, and the inner margin with a slight median projection; their colour is rusty-brown; there is a large but vague paler blotch at the costal portion of the base occupying nearly a quarter of the entire area of the wing; the hind margin of the wing is brown at the tip, but grayish below the tip; the gray is bounded on the inner side by a slender white bar, which is interrupted in the middle; most of the wing-rays are dark, but not uniformly so; the fringe is alternately pale gray and dark brown: the hind wings are dingy-brown, with a spotted fringe, and a dark suffused blotch at the anal angle: the head and thorax are coloured much like the fore wings, the body much like the hind wings.

According to Hübner, the CATERPILLAR rests with the anal extremity raised, and the anal claspers not touching the food-plant; the head is rather flat, and about equal in width to the second segment; the body gradually increases in size to the fifth or sixth segment, and then as gradually decreases to the twelfth, which again increases, rising into a medio-dorsal pyramidal hump: the colour of the head is brown, of the body dingy-white, with a medio-dorsal brown stripe, which, commencing immediately behind the head, expands on the third, fourth, and fifth segments, and then again contracts and terminates in the pyramidal hump; the spiracles are white, each surrounded by a black ring; and there is a black dot immediately above and below each; the ventral area, legs, and claspers are brown. (*See* fig. 11, p. 203.)

The MOTH appears on the wing in May. Mr. Greene is said to have taken fifty-four of the caterpillars at Tring, and he informs us that he "found a chrysalis under moss on a beech-tree (*Fagus sylvatica*), having doubtless wandered from some neighbouring maple." This was in October, at Halton, in Buckinghamshire. (The scientific name is *Notodonta cucullina*.)



401. The Scarce Prominent (*Notodonta Carmelita*).

401. THE SCARCE PROMINENT. — The palpi are very small and inconspicuous; the antennæ are slightly pectinated in the male, quite simple in the female: the fore wings have the costa nearly straight, the tip pointed; the hind margin very slightly scalloped, the inner margin with a small median projection; their colour is pale purplish-brown throughout the costal area, shading to purplish-gray throughout the inner-marginal area; on the costa itself is a very conspicuous crescentic white spot at one-third of the distance between the tip and the base; and half way between this and the base is a small and insignificant whitish spot, sometimes scarcely perceptible; two transverse series of triple spots cross the disk of the wing; these are seated on the wing-rays, and each is composed of a whitish dot, accompanied by a darker dot on each side; the fringe is alternately brown and whitish, and the extreme margin within the fringe is indicated by a scalloped brown line: the hind wings are purplish-gray, with a darker cloud at the anal angle and a spotted fringe: the head and thorax are purple-brown, the latter with a whitish blotch at the base of the body, which is uniformly brown.

The head of the CATERPILLAR is pale semi-transparent green, with two approximate longitudinal yellow lines on the face, separated only by the usual suture; the dorsal surface of the body is apple-green, with raised pale yellow markings variously situated; there is a bright stripe along each side, being a dilated skinfold, and including the spiracles, which are black; this stripe is of three colours, white, yellow, and pinkish-red, the colours being clearly defined; it commences immediately behind the head, and extends the entire length of the caterpillar, passing below the anal flap; the belly, legs, and claspers are glaucous-green. It feeds on birch (*Betula alba*), and is full-fed in June or July, when it buries itself in the earth and changes to a CHRYSALIS.

The MOTH usually appears in April, sometimes in March. It has been taken at Birchwood, in Kent, West Wickham, in Surrey, Hurstpierpoint, in Sussex, Epping, in Essex, and Cockermouth, in Cumberland. (The scientific name is *Notodonta Carmelita.*)



402. The White Prominent (*Notodonta bicolor*).

402. THE WHITE PROMINENT.—The antennæ are slightly pectinated in the male, quite simple in the female: the fore wings have the costal margin very slightly arched, the tip obtuse, and the inner margin has a slight angle or notch about the middle; their colour is white with two oblique transverse series of black spots, one before, the other beyond the middle of the wing: neither extremity of the first series quite reaches the costal or the inner margin; it is accompanied on its outer side by two orange blotches, the upper of which is double and very short, the lower is also double at the end nearest the body, but is prolonged almost to the anal angle, crossing the second transverse series of black spots: the hind wings are light and spotless; the head, thorax, and body are white; the last is sometimes tinged with fawn-colour.

Hübner figures the CATERPILLAR in a nearly straight position: the head narrower than the second segment, and rather porrected; the body almost uniformly cylindrical, the divisions of the segments being conspicuously marked. The colour of both head and body is green, rather approaching to olive-green, and adorned with a bright yellow stripe on each side, commencing im-

mediately behind the head, and extending into the anal claspers; this yellow stripe includes the black spiracles: four other stripes are indicated on the dorsal area: these are slightly darker than the ground colour: the legs are nearly black; the claspers green. (*See* fig. 10, p. 203.)

The MOTH appears in June: it is said to have been taken at Killarney, in Ireland, by the late Mr. Bouchard, and also at Burnt Wood, in Staffordshire, as recorded in the *Zoologist* for 1861, at p. 7682, in these words: "At the ordinary meeting of the Manchester Entomological Society, held on the 3rd of July, 1861, Mr. John Smith, an artisan collector resident here, exhibited a specimen of *Notodonta bicolor*, captured by himself at Burnt Wood, Staffordshire, in the latter part of June last. The specimen is a fine male, though a little rubbed, through being boxed out of the net." There have been several subsequent records of this species at the same locality. (The scientific name is *Notodonta bicolor*.)



403. The Swallow Prominent (*Notodonta dictæa*).

403. THE SWALLOW PROMINENT.—The antennæ are moderately pectinated in the male, very slightly so in the female; the fore wings are rather long and rather narrow, their costal margin nearly straight, the tip rather prolonged and obtuse; the hind margin sinuous; the inner margin has a small and inconspicuous lobe or angle about the middle; their colour is pale whitey-brown in the centre, the costal margin darker, the dark part expanding into a narrow longitudinal chocolate-brown blotch near the tip; near the inner margin, and extending from the middle of the base to the hind margin, is a rich chocolate-brown shade, the upper margin of which vanishes in the pale median area; this shade is interrupted near the hind margin by several whitish longitudinal streaks; the first long, narrow, and pointed at the anal angle; the second somewhat like a compressed crescent; the third near the base and touching the thorax; the inner margin, especially near the base, has an ochreous tinge; the hind margin has three slender lines, the interior very pale, the next very dark, the exterior one is intermediate in colour between the other two; three lines are intersected by very pale wing-rays: the hind wings are very pale, with a compound brown blotch at the anal angle; the fringe is of two colours opposite the blotch, the inner pale, the outer darker; the thorax is umber-brown tinged with gray; the body grayish-brown.

The CATERPILLAR has rather a large head, very slightly notched on the crown and shining; it is of pale green colour: the body is almost uniformly cylindrical until the twelfth segment, which is humped, the hump terminating in a moderately sharp point; the colour of the body is whitish or glaucous-green on the back, with a broad paler green stripe on each side, and adjoining this there is a narrow raised yellow-green stripe, just below the spiracles, and touching all of them except that on the twelfth segment; it extends the entire length of the caterpillar, terminating in the anal claspers; on the summit of the twelfth or humped segment is a black transverse line. It feeds on poplar (*Populus nigra*), sallow (*Salix capræa*), &c., and is full-fed about the 22nd of September; it then spins a thin but large cocoon on the surface of the earth, attaching the upper part to a fallen leaf, which thus performs the office of roof to the domicile, in which it remains throughout the winter. There is a very common variety of this caterpillar, plain brown, without the slightest appearance of the lateral stripe: this occurs after the last change of skin.

The MOTH appears on the wing in May and June, and occurs throughout England, north, south, east, and west; also occasionally in Scotland. Mr. Birchall found it not uncommonly in the county Wicklow, in Ireland. (The scientific name is *Notodonta dictæa*.)



404. The Lesser Swallow Prominent (*Notodonta dictæoides*).

404. The Lesser Swallow Prominent. —The antennæ are moderately pectinated in the male, very slightly so in the female; the fore wings are rather long and narrow, the costal margin nearly straight; the tip is rather prolonged and obtuse, and the hind margin sinuous; the inner margin has a small and inconspicuous lobe or angle about the middle; their colour is pale whitish-brown in the middle, the costal margin darker, the darker portion being very narrow at the base, but expanding into a broader although still narrow chocolate-brown blotch near the tip; near the inner margin, and extending from the middle of the base to the hind margin, is a rich chocolate tint, the upper margin of which shades off into the pale median area; the hind margin has three slender lines, the interior very pale, the next very dark, and the third or exterior line is intermediate in tint between the other two; these lines are intersected by the whitish wing-rays; at the anal angle is a long wedge-shaped white mark, its tip pointing towards the base of the wing; opposite the lobe is another white mark in the form of a compressed crescent, and near the base a white streak which touches the thorax: the hind wings are very pale, with a compound brown blotch at the anal angle: the thorax is umber-brown tinged with gray; the body grayish-brown.

The caterpillar has rather a large head, slightly notched on the crown, brown and shining; the body is almost uniformly cylindrical until the twelfth segment, which is humped, the hump terminating in a somewhat sharp and very shining papilla; the thirteenth segment is rugose above; the colour of the back is purple-brown, very shining when full-fed; on each side is a distinct yellow stripe, which includes the spiracles, excepting that on the twelfth segment; the spiracles are black, the ventral is much paler than the dorsal area. This caterpillar, when compared with that of *Notodonta dictæa*, may be distinguished by its somewhat more slender proportions, by its more glabrous skin, by its uniformly possessing the purple-brown hue, and by the greater brightness and distinctness of the lateral stripe. It feeds on birch (*Betula alba*), and is full-fed at the end of September, when it descends to the ground, spinning a slight cocoon between the surface of the earth and a fallen leaf: it remains in the chrysalis state all the winter.

The moth appears on the wing in June, and has been found in most of the English counties, but not commonly: Mr. Birchall records its occurrence in the county Wicklow, in Ireland. (The scientific name is *Notodonta dictæoides*.)

Obs.—My plan of describing each moth in full, without reference to any other, has compelled me to write two descriptions almost exactly similar; the principal distinguishing character between this and the preceding moth is to be found in the anal angle of the fore wings: in *Dictæa* the white mark is almost linear, but very sharp-pointed; in *Dictæoides* it is wedge-shaped, and decidedly more conspicuous.



405. The Iron Prominent (*Notodonta dromedarius*).

405. The Iron Prominent. — The antennæ of the male are slightly pectinated, those of the female quite simple; the fore wings are nearly straight on the costa, blunt at the tip, slightly scalloped on the hind

margin, and having a conspicuous lobe or angle near the middle of the inner margin; their colour is dull purplish-brown, with a pale blotch at the base, and two pale waved transverse bars, one before, the other beyond the middle, and midway between these is a transverse oblong discoidal spot, which has pale margins and dark centre; the outer pale bar expands into a decided pale spot on the costa; beyond the outer pale bar, and midway between this and the hind margin, is a rust-coloured bar frequently broken up into spots; the pale bars are generally accompanied by rust-coloured markings; the hind wings are smoky-brown, with a darker discoidal spot, a darker anal angle, and two paler transverse bars, the first below the middle of the wing, the second on the hind margin; all the wing-markings are obscure and confused: the head and thorax have the colours of the fore wings; the body is dingy-brown.

The head of the CATERPILLAR is broader than the second segment, and bifid on the crown, the lobes being blunt and rounded; it is shining and of a brown colour, speckled with darker brown; the sides are rather paler; the body is not regularly cylindrical, but uneven, being humped on the fifth, sixth, seventh, eighth, and ninth segments; the hump on the eighth segment is the least; those on the fifth, sixth, seventh, and eighth, have obtuse summits directed backwards; that on the twelfth segment is erect; the colour of the body is yellow-green, with purplish-brown markings, which form a conspicuous stripe on the back of the second, third, and fourth segments, and which crown all the five humps and fill the interstices between the second and third, and between the third and fourth; on the fifth hump this purple-brown colour forms a mere line, and there is a similar line on the last or thirteenth segment; a very similar colour occupies nearly the whole of the ventral area, which is darkest on the tenth, eleventh, and twelfth segments. It feeds on birch (*Betula alba*), and is full-fed about the 20th of September, when it descends the tree, and generally spins a slight cocoon on the earth, attaching the upper side of the cocoon to a fallen leaf; in this situation it remains in the CHRYSALIS state all the winter.

The MOTH appears in June, and has occurred not uncommonly in most of our English counties, and also in Scotland and Ireland. (The scientific name is *Notodonta dromedarius.*)

Obs.—The Irish specimens of this insect are much darker than the English ones, and have been described as a distinct species under the name of *Notodonta perfusca.* Mr. Greene states that he found nine chrysalids at the roots of alder (*Alnus glutinosa*).



406. The Three-Humped (*Notodonta trilophus*).

406. THE THREE-HUMPED.—The antennæ are slightly pectinated in the male, and simple in the female; in both sexes there is a fascicle of longish scales at the base; the fore wings are blunt at the tip, and have a prominent angle or tooth about the middle of the inner margin; their prevailing colour is umber-brown, with various markings of other tints between the base and the discoidal spot; a double transverse line, waved but almost direct, crosses the wing from the costa to the inner-marginal lobe; the interior portion of this line is light, the outer dark; the discoidal spot is very conspicuous, transverse, and oblong the middle is rust-coloured, the exterior gray; parallel with the hind margin is an oblique and rather vague ferruginous band, bordered exteriorly with gray; at the anal angle this band turns inwards and upwards towards the discoidal spot, but is lost before reaching it; above the discoidal spot is a pale costal blotch, and beyond this a short gray oblique streak: the hind wings are gray, tinged with brown, and having a conspicuous but vague blotch at the anal angle, which extends some distance along the inner

margin; this blotch is almost confined to the fringe; the head and thorax are umber-brown, spotted with gray; the body brown and unspotted.

The CATERPILLAR rests with the anal extremity elevated, and the anal claspers not touching the food-plant; the head is about equal in width to the second segment; the fifth, sixth, and seventh segments have each a medio-dorsal pyramidal hump; the twelfth segment is almost produced into a kind of dorsal hump; the colour of the head is brown, of the body glaucous-green, This description is made from Hübner's figure.

The caterpillar was once taken at St. Osyth, in Essex, by Mr. Douglas, who succeeded in rearing the moth. One or more European specimens are sometimes sold as British in the sales of British insects by auction in London. (The scientific name is *Notodonta trilophus*.)

Obs.—The name has been changed into *Tritophus* by modern entomologists, but I think without reason; indeed, I have a great objection to the change of a specific name under any circumstances, unless it be a duplicate name in the same genus: the derivation is from the Greek word *Trilophia*, that is, bearing three crests, lobes, or humps, in allusion to three dorsal protuberances of the caterpillar. (*See* fig. 13, p. 203.)



407. The Pebble Prominent (*Notodonta ziczac*).

407. THE PEBBLE PROMINENT.—The antennæ of the male are slightly pectinated, those of the female quite simple; the fore wings are nearly straight on the costa, blunt at the tip, and have a decided tooth or angle near the middle of the inner margin; their colour is clear ochreous-brown, except a large pale gray blotch occupying the middle third of the costal margin; this blotch is bounded towards the base of the wing by a straight dark line extending half way across the wing, and towards the tip it is bounded by a dark, crescentic mark, the cusps of which are turned towards the hind margin, and this crescentic mark combines with other darker and lighter markings in forming a large eye-like ornamentation, which occupies the apical portion of the wing; there is a slender dark line on the extreme hind margin, and a brown fringe beyond this: the hind wings are dingy-brown, with an indistinct crescentic discoidal spot, and an indistinct transverse pale bar: the head is plain brown, the thorax variegated with different shades of brown, and the body uniform dingy-brown.

The CATERPILLAR has a large head, and its body has one hump on each of the sixth, seventh, and twelfth segments; that on the sixth is largest, and points backwards; the colour of the head is brown: of the body purple-brown, with darker patches on the back of the second, third, and fourth segments, also on the front of the dorsal humps; these darker patches are bordered with paler margins, and there are also paler oblique lines on the sides of the segments: the eleventh and twelfth segments are yellowish, dorsally marbled with brown: there are two pale approximate lines on the back of the eighth, ninth, and tenth segments. It feeds on several species of poplar (*Populus*), and sallow (*Salix*), and is full-fed at the end of September, when it spins its slight cocoon on the surface of the earth, and remains in the CHRYSALIS state all the winter. (*See* fig. 12, p. 203.)

The MOTH appears on the wing in May, and in our breeding-cases continues to make its appearance throughout June, July, and August. It occurs in all parts of England, and Mr. Birchall says it is not uncommon in Ireland. (The scientific name is *Notodonta ziczac*, so called from the extraordinary appearance of the caterpillar when at rest.)



408. The Great Prominent (*Notodonta trepida*).

408. The Great Prominent.—The antennæ are long, decidedly pectinated towards the base in the male, but become almost simple and hair-like towards the tip; in the female they are quite simple: the fore wings are rather long and narrow, slightly arched, but blunt at the tip, and having a decided lobe or angle near the middle of the inner margin; their colour is smoky-brown, slightly suffused with a saffron tint, and ornamented with a great number of transverse and longitudinal darker markings, among which a transversely oblong discoidal spot is perceptible, but not conspicuous; it is ochreous, with a darker central line: the hind wings are semi-transparent, almost white, the inner margin tinged with saffron-colour; there are also a number of darker markings about the costal margin and tip, and a series of dark brown markings on the hind margin: the head and thorax are brown, variegated with saffron-tinted gray; the body is velvety-brown.

The head of the caterpillar is as wide as the second segment; the crown is elevated, but scarcely notched; the body is smooth, almost uniformly cylindrical, and without humps: the colour of the head is pale apple-green, with four pale stripes down the face; the median pair are somewhat approximate towards the crown, but more widely separated towards the mouth; the mouth and a conspicuous mark on the lower portion of the cheeks are brown: the body is apple-green, the dorsal surface slightly glaucous; there are two narrow approximate yellowish-white stripes down the back, extending the entire length of the caterpillar, but interrupted at the anterior extremity; exterior to this double stripe on each side is an irregular and very indistinct series of dots of the same colour; the second segment has a lateral blotch of brownish-yellow below the spiracle; the third segment has a larger and more elongated blotch, extending at its posterior extremity towards the back; these two blotches and the mark on the cheek form a single oblique patch, when the caterpillar is at rest; the fourth segment has a small lateral spot of the same colour, and on each side beyond this are seven oblique stripes on each side of the caterpillar, the seventh being longer than the rest, and terminating in the anal flap; these oblique stripes are longitudinally divided, the upper portion being pink, the lower white or whitish-yellow; near the inferior extremity of each stripe, and almost touching it, is a pale spiracle in a black ring; in the seventh stripe the spiracle is almost in the middle; the legs are pinkish; the claspers are of the same colour as the ventral area of the body, but are tinged with purple at the extremities. It feeds on oak (*Quercus robur*), and Mr. Greene has been successful in finding the chrysalids at the roots of oak-trees in September.

The moth appears on the wing in May and June: it is esteemed a rarity, but has occurred in several of our English counties, and Mr. Birchall says it is not uncommon in the county Wicklow, in Ireland. (The scientific name is *Notodonta trepida*.)



409. The Lunar Marbled Brown (*Notodonta chaonia*).

409. The Lunar Marbled Brown.—The antennæ are pectinated in the male, simple in the female; the fore wings are nearly straight on the costa, blunt at the tip, and have a small tuft-like lobe or angle about the middle of the inner margin; their colour is pale smoky-black, with three zigzag transverse bars, all of them white with black margins; the first is very short, and very close to the body; the second is before the middle of the wing, and nearly direct; the third is beyond the middle of the wing, oblique, and very sharply zigzag; the area between the first and second bar is uniformly smoky; that between the second and third bars is very pale gray, with a transverse smoky cloud, and a narrow crescentic discoidal spot; the hind-marginal area is smoky, with an indistinct waved median bar, which intersects the darker wing-rays; the fringe is alternately gray and smoky; the hind wings are smoky-gray, with darker wing-rays, and a very indistinct paler median band; the head and collar are white or gray: the thorax gray; the body dingy-brown.

The full-grown caterpillar rests in a nearly straight position, and with the anal claspers frequently attached to a twig of the food-plant; the head is manifestly narrower than the second segment, rather flat and porrected; the body is slightly attenuated at both ends, and the segmental divisions are very strongly marked, otherwise the caterpillar is uniformly cylindrical; the anal claspers are long, and are stretched out behind; the colour of both the head and body is pale sickly-green, sometimes approaching to glaucous, and this is the usual colour all over; but Mr. Hellins informs me that the ventral surface is full green in some specimens: there are four narrow yellow stripes, two of them dorsal: one on each side dilates slightly at each spiracle, which it encloses: the spiracles are black; the legs and claspers are unicolorous with the body. It feeds on oak; but I have not seen a specimen, and therefore have described the caterpillar from Hübner's figure. Mr. Greene says of the chrysalis of this species that it is stouter and smoother than that of *N. dodonæa*, but not so glossy.

The moth appears in May; it is a rare species in Great Britain, but seems widely distributed, and Mr. Birchall informs us it has been taken at Killarney, and in the county Wicklow, in Ireland. (The scientific name is *Notodonta chaonia*.)



410 The Marbled Brown (*Notodonta dodonæa*.)

410. The Marbled Brown.—The antennæ are pectinated in the male, simple in the female; the fore wings are nearly straight on the costa, blunt at the tip, and have a small tuft-like lobe or angle about the middle of the inner margin; their colour is smoky and marbled-gray at the base, intersected by a curved paler transverse line, which, descending from the costa, terminates in the inner-marginal lobe: this smoky area is followed by a broad pale gray almost white band, and the hind-marginal area is of nearly the same colour as the basal area, but generally more marbled and varied; there is no discoidal spot; the fringe is alternately gray and smoky; the hind wings are pale smoky, with darker wing-rays, and an indistinct transverse paler band: the head, collar, and sides of the thorax are very pale gray, sometimes quite white; the hind part of the thorax is smoky, varied with gray; the body is fawn-coloured.

The head of the caterpillar is broader than the second, third, or fourth segments; its colour is bluish-green and reticulated; the body is pale green, and is transversely

wrinkled; it has two yellowish and very narrow stripes near together down the middle of the back; these under a lens are seen to be composed of yellow dots; two similarly-dotted stripes are observable outside these, but not extending beyond the sixth segment; on each side of the caterpillar, extending from the head to the anal point, is a raised pale stripe, which is alternately pink and pale yellow, and which includes the spiracles. It feeds on oak (*Quercus robur*), and is full-fed about the 4th of September, when it spins a slight cocoon on the surface of the ground, and changes to a CHRYSALIS, in which state it remains throughout the winter.

The MOTH appears in May: it occurs in Kent, Essex, Sussex, Surrey, Hampshire, and Gloucestershire, in the South, and in Cumberland, Lancashire, and Westmoreland, in the North of England. Mr. Birchall says it is not uncommon at Killarney, in Ireland. (The scientific name is *Notodonta dodonœa.*)



411. The Figure-of-Eight Moth (*Diloba cæruleocephala*).

411. THE FIGURE-OF-EIGHT MOTH.—The antennæ of the male are pectinated, those of the female simple: the costal margin of the fore wings is nearly straight, the tip blunt; their colour is leaden-brown, glossed, in recently disclosed specimens, with mother-of-pearl reflections; they are traversed by two angulated black lines, the first of which is nearly direct, and situated near the base of the wing; the second is beyond the middle of the wing, very oblique, and very much bent and angulated, and, although very distant from the first on the costa, almost joins it on the inner margin: between these two lines are two very large kidney-shaped white spots with double nuclei; these remarkable spots bear a superficial resemblance to figures-of-eight, whence the name of the moth: the hind wings are dingy-brown, with darker wing-rays, an indistinct discoidal spot, and a dark, almost black, blotch at the anal angle: the head and thorax are gray-brown; the body brown.

The EGGS are laid in September in clusters of six or eight at the base of the lateral shoots of whitethorn (*Cratægus oxyacantha*), or blackthorn (*Prunus spinosa*), the leaves of these shoots being the earliest to expand in the spring, when the caterpillar emerges from the egg-shell. When full-grown, which is usually in May or June, the CATERPILLAR has a small head of a blue-green colour with two black spots on the crown; the general colour of the body is glaucous-green above, tinged with smoke-colour, and having a median rather broad yellow stripe interrupted at each junction of two segments; on each side, just below the spiracles, is another yellow stripe seated on a longitudinally-raised fold of the skin; below this the body is smoky-green, shading off to yellow-green on the ventral area; on every segment are numerous black warts, each of which emits a single black bristle; the most conspicuous of these warts are four on the back of every segment; the anterior nearer together than the posterior pair: the yellow median stripe passes between them, leaving two on each side: each of the warts seems to acquire a greater intensity of colour from its being surrounded by a paler space: the legs are shining, glaucous, and black-spotted; the claspers opaque green, with two black spots on each. It feeds on whitethorn (*Cratægus oxyacantha*), and is full-fed about the middle of June, when it spins an oblong cocoon formed of minute particles of the rind of the whitethorn twigs, small fragments of the green leaves, and an abundance of silk; this is generally attached to the underside of a small hawthorn twig: in this it changes to a CHRYSALIS, and remains in that state about two months.

The MOTH appears in September, and is common throughout England, but Mr. Birchall says it is not abundant in Ireland. (The scientific name is *Diloba cæruleocephala.*)

NOCTUAS.

THE NOCTUAS, OWL MOTHS, OR FULL-BODIES (in science *Noctuæ*), constitute the next principal division. They are very numerous; in Britain alone three hundred species have been discovered, and in Guenée's great work on the *Noctuélites*, no less than eighteen hundred and eighty-four are characterized; the three hundred species inhabiting Britain are remarkably uniform in appearance, size, and tint; there are, indeed, a few grand and striking departures from the usual brown and sombre colouring, but these exceptional instances, like gleams of sunshine in a dark cloudy day, seem to make the pervading gloom still more oppressive. This uniformity adds greatly to the difficulty of the describer; for, although the more striking differences may be rendered intelligible without much difficulty, it is comparatively a hard task to distinguish, either by words or representations, objects that closely resemble each other, and seem almost to defy our powers of discrimination, even when placed side by side.

Although this general uniformity pervades the Noctuas in their perfect state, there is a great difference among the caterpillars, both as to their appearance and economy. In the two species which stand at the head of the list, the Buff-arches and the Peach-blossom, the caterpillars are smooth and velvety, and feed exposed on the leaves of the bramble: they attach themselves by their ventral claspers, and hold the anal claspers slightly elevated, in the same manner as the Cuspidates. In the next genus, *Cymatophora*, the caterpillars live between two leaves, the edges of which they spin together; in this home they remain all day, with their heads turned round towards the middle of their bodies: they come out to feed by night. The caterpillars of the genus *Bryophila* reside in cases formed of silk and fragments of lichen, and come out to feed at night, and also in wet weather. In the large and interesting genus *Acronycta*, the caterpillars are generally hairy, sometimes excessively so, and greatly resemble the bear caterpillars of the Tiger-moths; they feed perfectly exposed, having no means of concealment. Many of the genera which follow these have perfectly smooth caterpillars, which feed on herbs, coming abroad only by night, and, when disturbed, roll themselves in a compact ring, and, thus disguised, fall to the ground, and, feigning death, remain motionless at the roots of the herbage until the supposed danger has passed. As regards the number of claspers, ten is the general number, the last, or anal, pair being always present. In the genus *Erastria* the first pair are wanting, and in the beautiful genus *Plusia* the first and second pair are wanting, the number being thus reduced to eight in Erastria, and to six in Plusia.

These caterpillars, as well as those of the grand genus *Catocala*, comprising the Clifton Nonpareil and the Red and Crimson Underwings, crawl with arched backs, like the Geometers, and hence were called by my predecessor, Half-loopers or Hemigeometers.

The pupation of the Noctuas is as various as the economy of the caterpillar; the greater number undergo this change underground; the numerous chrysalids found by gardeners in digging for the winter crops are those of Noctuas, for they abound everywhere; but others are found spun up among the leaves of trees, and others, again, on the ground; they are generally very shining, and of a bright reddish-brown colour, or black; the body is conical and

pointed. The chrysalids of the *Catocalæ* are covered with delicate powder, which exactly resembles the bloom on a plum.

The MOTHS have rather long and slender antennæ, always decreasing in size from the base to the tip; those of the male generally appear slightly stouter than those of the female, from their being downy or pubescent; and some are as decidedly pectinated as those of the Bombyces. Their trunks, or *maxillæ*, as I have called this organ at p. 205, are long and robust: when at rest by day, they are tightly coiled up under the head, but when abroad at night, expanded to their full length, and in constant use for sucking the honey of flowers. This honey-sucking propensity makes the Noctuas an easy prey to the entomologist, who avails himself of this taste for sweets, not only by searching their favourite flowers, but also by providing artificial sweets exactly to their taste. At night, Noctuas swarm on the blossoms of honeysuckle, jasmine, red valerian, and a number of other plants. It is, indeed, a beautiful sight to see the Noctuas revelling on the plant last named; if you take a bull's-eye lantern, and throw the light full on a party of moths feasting off these saccharine flowers of the valerian, the sight is one not soon to be forgotten; the glare of the lamp is reflected from a hundred pairs of the brightest eyes, and as these change their position in moving from flower to flower, the scene is almost magical Sallow bloom in the spring and ivy bloom in the autumn, are quite as attractive as valerian in the summer. Still more attractive is sugar, an artificial substitute for flowers. This discovery was first made known in the pages of the *Entomologist*, and has been the means of revolutionizing the science: species previously unknown have been discovered; and species previously of excessive rarity have become abundant. I will describe the process of sugaring for Noctuas. Buy three or four pounds of the strongest moist sugar,—it is usually called "Jamaica foots;" mix it with hot beer until it becomes of the consistence of treacle; carry it to the field of operations in a small tin can suspended by a strap passing over the shoulder. In a separate phial carry a modicum of rum, and, before using the mixture already described, add a few drops, perhaps a teaspoonful of rum. Select a tree with tolerably smooth bark, and, with a painter's brush, lay on the mixture in narrow stripes; then paint another tree; then a third, fourth, fifth, and so on in the same way. In twenty minutes return to the first tree, and the Noctuas will be found, with sparkling eyes, extended trunks, and gently quivering wings, revelling on the banquet thus provided. Now throw the light of the bull's-eye lantern full on the revellers, and box those you want in chip pill-boxes, holding the box below the moth, and the lid above, and so proceed until your coat-pockets are filled with pill-boxes, a rarity in each. I have always found a mild, damp, dark night the best for this occupation. The reader will please observe that this plan of entomologizing is often attended with some unpleasantness; such, for instance, as the obtrusive visits of game-keepers, who always require a bribe to leave you alone; and, in Ireland, the attention of the police, who are excited by a lantern, just as a turkey-cock is by a red rag, or a bull by a scarlet cloak or coat. Then, if the evening turn out rainy, the herbage becomes loaded with moisture, and boots, stockings, and trousers get saturated with moisture. Juvenile collectors are greatly comforted in the belief that they possess some nostrum with a long Greek name that will keep out wet; but this delusion is evaporated by experience, which, after all, is the most satisfactory guide. A writer in the *Intelligencer* says that aniseed has been found remarkably attractive to Noctuas; and another writer in the same periodical recommends the following method:—Instead of brushing the sugar on the bark of the trees, get some pieces of coarse rag, then mix up your bait and steep the rags in it; let them remain in soak until they are well saturated, when they may be pinned up wherever you wish, and, when done with, put away for another night. In Germany it is a common practice to cut apples in slices and thread them on a string, and, when dried, they are found

quite as attractive as sugar to the night-wandering Noctuas. It has also been found an excellent expedient to sugar isolated thistle-heads when standing up in fields. It is quite useless to offer any of these baits for Noctuas on a bright moonlight night.

As a general rule, it may be said that the fore wings of Noctuas entirely cover and hide the hind wings when the insect is at rest; they are never raised over the back as in Butterflies, or rolled round the body as in the Footmen: the ornamentation of the fore wings is very rarely indeed continued on the hind wings, as we so frequently see it more or less conspicuously in the Geometers; but it is very uniform, that is, it is generally referable to one pattern, which undergoes almost endless modification—for instance, near the centre of the wing, in the place occupied by the discoidal spot, which I have described in so many of the Geometers, there are two ocellated or eye-like spots, that is, spots having a different colour in the centre from that on the circumference: the one nearest the body is generally round, or nearly so, and is called the orbicular discoidal spot; the other nearer the tip of the wing, but still not very far distant from the first, is kidney-shaped, and is called the reniform discoidal spot; these two discoidal spots will be frequently mentioned in the descriptions which follow; the hind wings, besides being less variegated, are generally paler; nevertheless, in some instances, the hind wings are brilliantly yellow, red, or blue, these bright colours being transversely intersected with one or two black bands.

With regard to the position of the Noctuas in a natural system, I am unable to perceive their resemblance to the Geometers, which have always hitherto been placed between Noctuas and the Deltoids. The genus *Acronycta* unites the Noctuas with the Arctias, and the smaller Noctuas merge so gradually and naturally into the Deltoids that it is utterly impossible to tell where one tribe ends and the other begins: the series would be not only interrupted, but entirely broken by the intervention of the Geometers.



412. The Buff-arches (*Gonophora derasa.*)

412. The Buff-arches.—The antennæ are very slightly pubescent in the male, quite simple in the female; the fore wings are broad and ample, the tip very slightly arched; their colour is various, and their ornamentation extremely beautiful: an oblique white bar extends from the costa near its base to the anal angle, and this bar emits a branch towards the base of the thorax; a second white bar extends from the tip of the wing to the anal angle, where it unites with the oblique bar already described; these two bars unite with the costal margin in forming a triangle, which encloses at least two-thirds of the wing; the enclosed area is almost white near the costal margin, sienna-brown towards the base, and smoky-brown towards the hind margin; the whole is exquisitely and delicately pencilled; the basal area of the wing is smoky-brown, and has a semi-transparent appearance; the hind-marginal area is brown, transversely divided into five lines, and these are traversed by a scalloped line of pure white, which is so distinct as to appear like a white thread: the hind wings are smoky-brown; the head is umber-brown; the thorax brown, with its fore and hind margin raised in a ridge or crest; the body is brown; the second, third, and fourth segments are dorsally crested.

The caterpillar rests in a slightly bent position, both extremities being held clear of its food-plant, and the anal claspers unattached: the head is exserted, and has an almost square outline; the body is smooth and velvety; the colour of both head and body is a raw sienna-brown, with a rather paler medio-dorsal stripe: on each side of the fourth segment is a round white spot, and very frequently, but not constantly, a smaller white spot on each side of

the fifth segment; there is a short oblique dark stripe on each side of each segment, but this is by no means conspicuous or distinct; the spiracles are black; the ventral is paler than the dorsal area, indeed, inclined to gray; the legs are reddish-brown; the claspers are paler, corresponding to the ventral area; I have frequently found this caterpillar feeding on the common bramble (*Rubus fruticosus*), and I know of no other food-plant; when full-fed it spins a few leaves together, and in the retreat thus made it turns to a cylindrical CHRYSALIS with a conical body, which terminates in a slender horn-like point directed backwards.

The MOTH appears on the wing in July, and is common in most of the English counties; Mr. Birchall says it is very common in Ireland, and gives Killarney, Wicklow, Galway, and Howth as habitats. (The scientific name is *Gonophora derasa*.)

Obs.—Ochsenheimer has united the Buff-arches with the Peach-blossom, under the genus *Thyatira*; they are very different in appearance, and I quite incline to Mr. Bruand's view of keeping them distinct.



413. The Peach-blossom (*Thyatira batis*).

413. THE PEACH-BLOSSOM.—The antennæ are very slightly pubescent in the male, quite simple in the female; the fore wings are blunt at the tip; their colour is olive-brown, with one small and four large roundish spots on each, and also one additional large spot common to both wings near the middle of the inner margin; the largest of these spots is amorphous, and is seated at the base of the wing; two others closely approximate are at the extremity of the costal margin; a fourth occupies the anal angle; and close to this on the hind margin is the smaller spot already mentioned; the disk of all these remarkable and very ornamental spots is rosy or rosy-brown, but their circumscription is white; they have much the appearance of the fallen petals of some flower, whence the name of "Peach-blossom:" the hind wings are dingy-brown, with a paler and indistinct transverse median band: the head is pale brown; the thorax pale brown with transverse bars of rosy-brown, faint and delicate; the body is pale brown, the second, third, and fourth segments having a small dorsal crest.

The CATERPILLAR rests with the anal claspers raised from its food-plant, and apparently not used for prehension; the legs likewise are seldom attached. The head is about equal in width to the second segment: the face is prone, and the crown slightly produced and indistinctly notched; the body is rather velvety, the dorsal area irregularly humped; the principal hump is on the third segment; it is bifid, projected forwards, generally extending over the second segment, and sometimes over the head; the fourth and fifth segments are nearly simple, but those which follow from the sixth to the tenth, both inclusive, have each a medio-dorsal crest or hump; the twelfth segment is dorsally pointed: the colour of the head is reddish-brown; the dorsal area of the body is reddish-brown, marbled with reddish-gray; it feeds on the common bramble (*Rubus fruticosus*), and in September, or sometimes as early as the end of August, spins a very slight and loose cocoon among the leaves, and when in confinement among the moss or rubbish on the floor of the breeding-cage, and therein changes to a blackish CHRYSALIS, which has a stout thorax but rather small conical body and a sharp anal point.

The MOTH appears on the wing in June and July of the following year, and is far from uncommon in most of our English counties, and Mr. Birchall says it is very common in Ireland. (The scientific name is *Thyatira batis*.)



414. The Lesser Satin Moth (*Cymataphora duplaris*).

414. The Lesser Satin Moth.—The antennæ are slender in both sexes, and almost simple, but slightly stouter in the male than in the female; in both sexes they have a very short pubescence: the fore wings are nearly straight along the costa, and square-tipped, they are very ample compared with the size of the body; their colour is smoky-gray, transversely marked with different shades of the same colour; the basal area is pale, bounded by an almost white line; the middle area is dark smoke-coloured, taking the form of a broad median band, on the exterior margin of which are two sub-linear black marks, which, perhaps, represent the orbicular discoidal spot; then follows a paler band and then a smoky hind-marginal area, which is traversed throughout by a zigzag white line: the hind wings are dingy-gray, with a paler transverse median bar: the head and thorax are smoky-gray; the body, which is very slender, almost like that of a Geometer, pale gray.

The caterpillar resides between two leaves of birch (*Betula alba*), carefully fastened together with silken cords; I found that instead of eating the leaves it used for a domicile, it left them by night and ate other leaves in the neighbourhood; when ejected from its dwelling-place by day, it usually retreated backwards and invariably hung by a thread; no persecution could induce it to roll in a ring or feign death: but when on the carpet or table-cloth it crawled to some place of concealment with restless and unceasing activity,—these characters, which it possesses in common with several species which follow, have reminded me of those of the Tortrices. The head is slightly narrower than the second segment; the crown gibbose and very shining; the body is slightly depressed dorsally and flat ventrally: the colour of the head is pale brown across the middle of the face, and has a black space between the lobes of the crown, and a black spot on each side of the mouth; the dorsal area of the body is occupied almost exclusively by a very broad bluish smoke-coloured stripe, within which, on each lateral margin, is a series of white marks, two on each segment; the lateral area is whitish, slightly mottled with smoke-colour; the belly, legs, and claspers, are dingy whitish-green.

The moth appears on the wing about midsummer, and has occurred in most of our English counties: Mr. Birchall informs us that he has taken it at Killarney, in Ireland. (The scientific name is *Cymatophora duplaris*.)



415. The Satin Carpet (*Cymatophora fluctuosa*).

415. The Satin Carpet.—The antennæ are slender and very slightly pubescent in both sexes; they are rather stouter in the males; the fore wings are very ample, nearly straight on the costa, and bluntly square at the tip; their colour is pale gray at the base, traversed always by one, sometimes by more, waved transverse lines; the middle area is occupied by a broad smoky band; this is followed by a pale gray, almost white, band traversed by darker lines, the exterior of which dilates and deepens into a costal blotch; the hind-marginal area is smoky-gray; the hind wings are pale gray, almost white; the head and thorax are smoke-coloured, the body smoky-gray.

The caterpillar resides between two leaves of the birch (*Betula alba*) when young; when older, it uses more leaves than two for the purpose of a domicile, and in this always remains concealed during the day, feeding by night only: it has a great pro-

pensity to fall, and hang by a thread when disturbed. The head is about equal in width to the second segment, the divisions of the crown are rather convex and prominent; the body is dorsally depressed, ventrally flattened, it bears numerous fine scattered hairs; the colour of the head is dark brown on the crown, paler across the face, and has a black spot on each side, close to the mouth: the colour of the body is almost white, or yellowish-gray; the dorsal area more inclining to gray, and having a narrow slightly darker medio-dorsal stripe, probably due to food in the alimentary canal; there is also a distinct black mark on each side of each segment; the sides and belly are whiter than the back. My specimens were full-fed at the beginning of October, and then spun slight cocoons among the birch leaves, in which to turn to CHRYSALIDS.

The MOTH appears on the wing in June. It seems to be of much more limited distribution than those species which immediately precede and follow. My specimens have come from Huddersfield and Ipswich, and I have seen others from the western counties. Mr. Birchall has taken it at Killarney, in Ireland. (The scientific name is *Cymatophora fluctuosa*.)



416. The Lesser Lutestring (*Cymatophora diluta*).

416. THE LESSER LUTESTRING. — The antennæ are slender and very slightly pubescent in both sexes, but most so in the males: the fore wings are ample, very slightly curved on the costa, and bluntly square at the tip; their colour is dingy-gray, with a tendency to a brickdust-red tinge in fine and recently disclosed specimens; at the base there is usually a darker shade, and there are two distinct transverse brown bars; one of these is rather before, the other rather beyond, the middle; both of these are nearly direct, but their borders are waved, and both of them are evidently composed of four lines crowded together; there is a third but indistinct band nearer the hind margin, and a delicate dark line on the margin itself: the hind wings are gray, with two faint transverse bars of a darker tint: the head, thorax, and body are gray; the body is stout, and invariably has one, and sometimes two, erect medio-dorsal tufts of black scales near the base.

The CATERPILLAR resides resting on its ventral surface, and with its head turned on one side, between two spun together leaves of oak (*Quercus robur*) or birch (*Betula alba*), and comes out of its domicile to feed during the night; it hangs by a silken thread when driven out of this retreat. The head is narrower than the second segment, rather convex on the crown, and very glabrous: the body is obese and maggot-like; it bears numerous fine scattered hairs. The colour of the head is dark brown, almost black; of the body pale gray, with a narrower medio-dorsal stripe rather darker, and a narrow lateral stripe rather lighter; the spiracles and a series of dots beneath them are nearly black. It spins a slight cocoon among the leaves, and therein changes to a CHRYSALIS towards the end of June or beginning of July.

The MOTH appears on the wing in August, and occurs in most of the English counties; Mr. Birchall also reports it from Killarney, in Ireland. (The scientific name is *Cymtaophora diluta*.)

Obs.—The upper figure represents a very beautiful variety in the cabinet of Mr. Bond, kindly lent me expressly to figure in this work; but it is not a species given to variation, this and its immediate congeners being insects of much uniformity in tint, markings, and size.



417. The Poplar Lutestring (*Cymatophora Or*).

417. The Poplar Lutestring.—The antennæ are very slender in both sexes, but slightly stouter in the males than in the females: the fore wings are scarcely curved on the costa, and bluntly square at the tip; their colour is gray, with two transverse dark lines at the base, and two transverse bands; the first, the broader of the two, is nearly direct, and is situated before the middle of the wing; it is composed of four dark lines; the second, beyond the middle of the wing, is rather oblique, and is composed of four zigzag lines; between these bars the orbicular and reniform discoidal spots are perceptible, but not conspicuous: each has a pale area and a darker border; near the hind margin is a dark zigzag line, commencing in a dark streak at the tip of the wing, and on the very margin is a slender dark line: the hind wings are dingy-gray: the head, body, and thorax are gray; the body is stout and of a brownish-gray colour.

The caterpillar, when full-fed, resides habitually between two leaves of the poplar or aspen (*Populus nigra* and *Populus tremula*), on which it feeds: the two leaves thus converted into a residence are always on one shoot, so that the wind, moving the shoot or twig altogether, has no tendency to separate them; they are generally placed with the back of the upper leaf to the face of the lower one, and the edges are united together by silken threads, with much skill and neatness; in this retreat the caterpillar rests during the day in a curved form, the head being brought round towards the middle of the body, but the body invariably resting on its ventral surface, and not on its side; when driven from this retreat, it frequently escapes backwards, and but rarely falls to the ground, generally hanging suspended by a thread, The head is narrower than the second segment, the face rather flat and porrected; the body is rather depressed dorsally, and flattened ventrally; it has a number of minute warts, each of which emits a hair. The colour of the head is red, of the body whitish-green, or tinged with glaucous: it has a very bleached and semi-transparent appearance, probably owing to its habit of living protected from the sunlight; there is a medio-dorsal stripe of dingy-green, probably owing to the presence of food in the alimentary canal; this is especially visible when the caterpillar is crawling, an act which it performs with much activity when expelled from its retreat; just below the spiracles is a faint yellowish stripe; the ventral is rather paler than the dorsal area. It undergoes pubation in its retreat, and turns to a red-brown chrysalis.

The moth appears on the wing in June and July, and has been taken in most of our English counties. (The scientific name is *Cymatophora Or.*)



418. The Figure of Eighty (*Cymatophora ocularis*).

418. The Figure of Eighty.—The antennæ are very slender; the fore wings are ample, almost straight on the costa, and obtuse at the tip; their colour is pale brown, with a tinge of red in recently disclosed specimens; there is a slightly paler transverse median band, which contains the reniform and orbicular spots; these are closely approximate and very conspicuous and ornamental, the central area of each being dark and the border pure white; on the left wing this ornamentation represents the number 80, on the right wing it is re-

versed; the wing is traversed by several transverse dark lines, two or three of them before, and four or five beyond, the figure of eighty; there is a short oblique dark stripe at the tip: the hind wings are dingy brown, with two or three slender darker lines across the middle, and a darker hind margin: the head, thorax, and body are gray-brown: the body is stout.

"The CATERPILLAR is very pale yellowish-green, with greenish dorsal line, and greenish line along the spiracles, which are reddish; a row of black dots above the legs (*Frey*). It feeds on aspen (*Populus tremula*)."—*Stainton's Manual*, vol. i. p. 175. "The CHRYSALIS is black and stout, enclosed in an extremely delicate open network of a rusty-brown colour; it is very difficult to find; it frequently—nay generally—spins on the surface of the spreading moss, or barely beneath it, sometimes between two leaves; in this latter case it is soon blown away, and, in the former, falls an easy prey to the first prowling mouse: it should, therefore, be sought for as soon as possible after the change; this, I think, should certainly not be later than the first week in October. . . . I have found the following a very good method of obtaining it. Instead of turning up the sod, lay hold of the grass lying close to the trunk, and pull it (the sod) from the tree about an inch or so, and the chrysalis, if there, will almost invariably be found attached to the tree, or else among the blades of grass which lie close to it. Its presence may be detected by the open network alluded to above. If, after pulling the grass from the trunk, small pieces of bark are found loosely attached to it, *i.e.*, the trunk, they should be carefully removed and examined, as behind them the caterpillar frequently spins up."—*Greene's Insect Hunter's Companion*, p. 19.

The moth appears on the wing at the end of June, and has occurred in Norfolk, Suffolk, Essex, Buckinghamshire, and Worcestershire, but is always esteemed a rarity. Mr. Greene has taken it in Ireland. (The scientific name is *Cymatophora ocularis*.)



419. The Yellow-Horned (*Cymatophora flavicornis*).

419. THE YELLOW-HORNED. — The antennæ are stout, particularly in the males, and of an ochreous-yellow colour: the fore wings are rather narrow, the costa nearly straight, the tip blunt; their costal area is gray from the base to the middle; the remainder of the wing is dark smoky-gray, the orbicular spot is large, but rather indistinct; the reniform spot imperceptible; the wing is traversed by seven or more transverse dark lines, three of these are before the discoidal spots; these lines are perfectly separate at the inner margin, but united on the costa; two others are beyond the discoidal spots, and much bent; again, nearer the hind margin, are two others, waved and indistinct: the hind wings, head, thorax, and body, are gray-brown: the thorax is very stout, the body rather so.

The head of the CATERPILLAR is pale wainscot-brown, with a black spot on each cheek, near the mouth; the body is dingy yellowish-green, the second segment having six black spots, all of them close adjoining the head, and the two dorsal ones being larger than the rest; on each of the following segments are five black spots, the largest of which form a dorsal series; the second, smaller, constitute a supra-spiracular series; and the third, the smallest, an infra-spiracular series; each of the larger black spots has a row of three white dots above it, and one white dot below; the third and fourth segments have a transverse band or belt of twelve white dots. It feeds on birch (*Betula alba*), of which it rolls up the leaves into a kind of case, and only comes partially out to eat: it is almost impossible to beat this caterpillar: in order to obtain it, the rolled-up leaves must be sought out and picked: it is full-fed in the beginning of July.

The MOTH appears on the wing in March,

and is by no means uncommon in our English counties, and Mr. Birchall says it is common in Ireland. (The scientific name is *Cymatophora flavicornis.*)



420. The Frosted Green (*Cymatophora ridens*).

420. THE FROSTED GREEN. — The antennæ are dull yellow, rather stout, and, in the male, strongly ciliated; the fore wings are rather narrow, and have a very straight costa; their prevailing colour is gray-green, there being a broad transverse median band darker, a basal area paler, and a bar beyond the median band also paler: the hind margin is darker, and the fringe spotted alternately pale and dark: this distribution of colour is inconstant, and every part of the wing is ornamented with transverse markings: the hind wings are whitish-gray, with brown wing-rays, and a smoky cloud on the hind margin, especially towards the tip: the head and thorax are beautifully mottled with the colours of the fore wings; the body is rather stout and of the colour of the hind wings.

The EGGS are laid on the twigs of oak (*Quercus robur*) in April, and the young CATERPILLARS emerge in the beginning of June, and spin for themselves little domiciles for concealment or protection; this is generally effected by curling the edge of a young and tender oak-leaf, and securing it in that position by a few silken threads: it continues to conceal itself in this manner for several weeks, and appears to be full-fed by the middle of July. I took a great number on the 8th of July, 1864, beating them from the oaks in Birchwood. They fell into the umbrella without any covering; but, immediately it had the opportunity, each caterpillar constructed a domicile for itself, generally fastening together two oak leaves face to face, and allowing them to remain perfectly flat; but, in some instances, I found that a caterpillar had bent the tip of an oak-leaf backwards, and fastened it in this position in the manner always practised by the recently-emerged caterpillar: in either case the domicile was perfectly closed all round with silken threads: in this retreat it rests on its ventral surface during the day, having the head always turned on one side, and the thirteenth segment, with its claspers, tucked in under the preceding segment. I have never seen one feeding by day; at night it makes an opening in its dwelling-place, and devours the leaves within its reach, but never those of which its dwelling is constructed: sometimes a caterpillar would appear to be very circumspect in what might be called keeping its seat during temporary absence, the anal claspers adhering to the entrance of its retreat, while the body was stretched about in all directions: at other times it would come completely out and wander at random among the dwelling-places of its brethren; in such cases, it seems to lack the unerring instinct of the bee in returning to its own hive, for I have more than once seen two caterpillars contending for the same retreat: in these contests one of the combatants often receives an unpleasant gripe, and its pale green blood issuing from the wound, seems to impart cannibalistic propensities to the aggressor, for in these civil wars several caterpillars were destroyed and partially eaten. The head of the full-grown caterpillar is exserted, it is quite as wide as the second segment, having very gibbose cheeks and a notch on the crown: the body is very flaccid and wrinkled, both transversely and longitudinally, the latter more especially along the sides: the divisions of the segments are sufficiently obvious: a number of small but obvious warts occur on the body; the second segment is without these warts; the third and fourth have ten each; the rest, as far as the tenth, have eighteen warts each; six of these are arranged in a transverse series, reaching from spiracle to spiracle; two, not invariably present, are behind these; and five others are situated on each side below the spiracle. The colour of the head is wainscot-brown, reticulated with dingy-white; the colour is paler about

the mouth, and this pale region has a black reniform spot on each side of the mouth, including the ocelli, which are also black; on each side of the face, near the median division, is a whitish line, which ascends to the crown, and then turns obliquely towards the anterior margin of the second segment. The colour of the body is yellowish, the warts being white, and very frequently—that is, in many of the specimens—surrounded by a smoke-coloured ornamentation, that imparts a decidedly different appearance to those specimens which possess it; the spiracles are wainscot-brown, the bristles from the warts are white; the legs and claspers are very pale, almost white. From the 8th to the middle of July, I observed these caterpillars spinning their cocoons on the still verdant leaves of the oak; and, on subsequently examining these cocoons, I found them very tough and compact, and each contained a smooth, brown, obese CHRYSALIS, having a very pointed anal extremity, furnished with a series of minute hooks, by which it is suspended, head downwards, in the interior of the cocoon. From the circumstance of the perfect insect being almost invariably found on the trunks of the oaks in April, when they are perfectly denuded of leaves, it must be inferred that the falling leaves, acting as parachutes, carry with them, in their descent, the enclosed chrysalis, which, thus protected, remains on the ground until the moth makes its escape: in confinement, this escape took place at the end of February and the beginning of March —at least a month before the ordinary time in a state of nature.

"Of the chrysalis of this rare and very beautiful insect, I took twenty-six last autumn; like that of *Cymatophora ocularis*, it is extremely difficult to find, and should be sought for as soon as possible, viz., at the middle and end of August. The following directions may enable others to find it: detached oaks growing in meadows of a dry, loamy soil seem the best; the situation evidently preferred is the corners filled with dry rubbish and little stunted brambles. Insert the trowel well into the earth, six or seven inches from the *angle*, and turn up the sod, bramble and all, if possible: to find the chrysalis, after this is done, is a work both of time and pain; it will not do in this case to *tap* the sod. First, carefully examine the dead leaves, for the caterpillars frequently spin up in them: you must then, regardless of scratches, tear the roots asunder as gently as possible. The cocoon is very weak, composed of little bits of stick, dried leaves, &c., and requires delicate handling. Indeed the whole concern demands an elaborate manipulation."—*Greene.*

The MOTH appears on the wing in April, and seems to be very generally distributed in our English counties, but nowhere common. (The scientific name is *Cymatophora ridens.*)



421. The Marbled Green (*Bryophila glandifera*).

421. THE MARBLED GREEN.—The antennæ are slender, simple, and similar in both sexes; the wings are straight on the costa, and blunt at the tip; their colour is gray, with darker markings, and the whole suffused with green: there is a dark blotch at the base, followed by a white bar, which extends from the costal almost to the inner margin, but not quite; the inner discoidal spot is larger and reniform, the outer smaller and orbicular; the costa and fringe are spotted with black, and there are several transverse bent black lines: the hind wings are pale at the base, smoky at the margin, and the fringe is white and unspotted: the head and thorax are whitish-gray; the body gray. The ground colour of the fore wings is very variable, sometimes nearly white, sometimes gray-green, sometimes very decidedly green, and sometimes reddish-brown.

The EGGS are laid in September, on those flat lichens which so commonly cover the surface of stones used in building walls, bridges, houses, churches, &c.; they are white, and, when laid in confinement, are arranged in a perfectly straight line; they

are hatched in October; the little CATERPILLAR, on leaving the egg-shell, being perfectly black and very hairy: they appear to hybernate in the crevices of the stone while still extremely small, but in the following March or February, or even the end of January, if the weather happen to be wet and mild, they again begin to feed: each then constructs a new house for himself, a kind of cocoon made of silk and particles of earth, mortar, or stone; this cocoon has little resemblance to the usual formula adopted by caterpillars when preparing for pupation, but is very like the blister we occasionally see on paint; while tenanted, it is closed at both extremities, just as though the occupant had shut himself up to undergo pupation; in the night or early morning, more especially in wet weather, he gnaws an opening at one end of his dwelling-place, comes completely out, and feeds on the lichen; but during the greater part of the day, and indeed during the night also in very dry weather, he remains shut up in his house: in moist weather, after making a copious meal on the saturated and swollen lichen, each caterpillar seeks his accustomed shelter, always carefully fastening the door, or, in other words, spinning up the opening; but it is curious, and rather opposed to the ordinary habits of insects in this respect, that, as a general rule, each caterpillar is totally careless whether he return to his own dwelling-place or to that of some friend or relation: he will, without a moment's hesitation, coolly possess himself of any tenement he finds unoccupied, and carefully closing the entrance, maintain his position against all comers; supposing, however, that the tenement he examines with a view of taking possession be already occupied, he never presumes to intrude, never thinks of contesting the point, but continues to wander about on the look-out for a house until he finds one unoccupied: an occupied cell is invariably closed, so that when you find one open, you may at once conclude it is an empty house; in no instance do two caterpillars attempt to occupy the same dwelling as tenants in common. Should any difficulty arise in finding an empty house, which not unfrequently happens, the caterpillar sets to work in the most contented manner to construct one, and probably before long is as comfortably housed as any of his friends. I have said that in dry weather these caterpillars remain sealed up in their domiciles, and when this continues for long, they appear to suffer greatly from lack of food—for if, after a long continuance of drought, the cocoon be forcibly opened, the caterpillar is found in a very shrivelled and atrophied state, with its head disproportionately large and conspicuous. When full-fed, which is about the end of May, it has a limp and flaccid character very similar to that of a caterpillar that has been ichneumoned; it neither feigns death nor rolls in a ring when disturbed or annoyed, as probably the only protection it seeks or requires is that afforded by its case. The head of the full-grown caterpillar is porrected in crawling; it is rather narrower than the body, and is perfectly glabrous, but emits about thirty fine hairs, which are directed forwards; the body is of uniform substance throughout, the back slightly depressed, the belly flattened; each segment has twelve warts, and each wart emits a bristle. The colour of the head is intense black and shining, the labrum white; the dorsal surface of the body is dark smoke-coloured as far as the spiracles, and having an irregular narrow medio-dorsal yellowish stripe, interrupted on the tenth, eleventh, and twelfth segments; the warts and bristles are white, the ventral surface beginning at the spiracles, as also the legs and claspers are ochreous-yellow; in very wet weather, when the caterpillar feeds voraciously, the belly and all the under parts assume a tinge of green: nevertheless, although these parts assume this green tinge after voracious feeding, they invariably return to their normal colour before pupation, thus proving the altered tinge to be the result of repletion; when the time of pupation arrives, they usually secrete themselves in holes in the wall, and spin a slight web among old spiders' webs, dust, and crumbled earth or mortar, in which they undergo the change, but sometimes they use for this purpose

the cocoons they had previously constructed as habitations during their caterpillar state; they usually remain in the chrysalis state throughout June and July. On account of its peculiar economy, this species is rather difficult to manage in confinement; the caterpillars from which my description is made, proved exceedingly restless in confinement, and pertinaciously refused to build or to feed on the diversified banquet of lichens which I provided for their well-being.

The MOTH appears on the wing in July and August, and is abundant, but local, in our southern counties, occurring in plenty on walls at Exeter, Plymouth, Brighton, &c., and formerly on the canal bridge in the Old Kent Road, where I have not seen it for twenty-five years; I know of no other locality in the London district: it comes freely to sugar. (The scientific name is *Bryophila glandifera*.)



422. The Marbled Beauty (*Bryophila Perla*).

422. THE MARBLED BEAUTY.—The antennæ are slender, simple, and similar in both sexes; the fore wings are very nearly straight on the costa; the tip is blunt; their colour is pale gray, almost white, and varied with darker markings of a smoky-gray, but these as well as the general surface of the wing are often suffused with a greenish and sometimes with an ochreous tinge; there is always a dark blotch at the base of the wing, and this is followed by a white bar, which extends from the costal to the inner margin; the discoidal spots are very large, vague, and almost united with each other, and also with the inner margin by a smoky cloud; the costal margin and fringe are spotted with blackish-gray, and there are several transverse lines of the same colour. The hind wings are pale, but smoky towards the margin; the head and thorax are white, the body smoky-gray.

The EGGS, which are white, are laid in August and September on those fat lichens which are so commonly found growing on brick walls: in the neighbourhood of London are many such localities, and in one in my own immediate neighbourhood there is a brick wall which these little moths have colonized, and which I have been in the habit of visiting for the last twenty years.

The young CATERPILLARS, which are at first very dark coloured, and very hairy, emerge from the egg-shell in about a fortnight—indeed, the time varies from ten to twenty days; at the approach of winter they are still very small, and, spinning little silken cocoons in the crevices of the bricks or mortar, remain entirely concealed during the winter; in the spring they begin to feed again, eating nothing but the flat lichens on which the eggs are laid, and these only when saturated with moisture; the colony I have more particularly observed is on a wall facing the south, and exposed to the mid-day sun, but the caterpillars always retire from the sunshine, concealing themselves in little silken domiciles; they feed morning and evening, when the atmosphere is laden with moisture; and in wet weather in the day also; the lichens absorb water, whether from dew or rain, and it is only in this moistened state that they are relished by these little caterpillars, which then feed greedily, and are rarely found at rest except in their cocoons. When full-fed, the head is rather small, and is retractile within the second segment; it is shining, slightly hairy, and of a bluish-black colour on the crown and sides, but the face is spotted with black; the body is stout, and of uniform thickness throughout, with the back slightly depressed, and the belly flattened; each segment has twelve small warts, and each wart emits a bristle; the dorsal area is almost entirely occupied by a broad slate-coloured stripe, which is bounded on each side by a series of orange markings, narrow, linear, or somewhat crescentic; between this series of markings and the legs is a slender white line on the anterior segments, and attached to each of the markings is a small white spot; the

ventral area is smoke-coloured tinged with green, and the legs and claspers are of the same colour. When arrived at its full size, it finally leaves its silken home and builds another, in which it changes to a smooth CHRYSALIS, which is of a testaceous red colour, the wing-cases being especially red; it is covered with a slight whitish bloom, like that of a ripe plum; the last segment is fluted, and terminates in three spines, the outer ones of which are smaller than the middle one.

The MOTH appears on the wing in July, August, and September; there seems to be a continuous succession of moths for about ten weeks: it is very common in most of our English counties, and occurs also in Scotland and Ireland. (The scientific name is *Bryophila Perla*.)



423. The Tree-lichen Beauty (*Bryophila Algæ*).

423. THE TREE-LICHEN BEAUTY.—The antennæ are slender, simple, and alike in both sexes. The fore wings are rather ample, nearly straight on the costa, and rounded at the tip; their colour at the base is gray-green, followed by a nearly straight transverse bar almost white; then follows a broad median brown band, which includes a darker discoidal spot; then follow a very pale bar, very distinct, and divided at both extremities, but less distinct in the middle, and lastly, a grayish or brownish green hind margin: the hind wings are brown, with a perceptible but not very conspicuous crescentic discoidal spot: the head and thorax are brownish-green, the body paler, with a medio-dorsal series of black spots.

The CATERPILLAR is gray-green, marbled, with a white medio-dorsal stripe, and a series of white lateral spots; a stripe near the spiracle, and a horse-shoe shaped marking are black; the head also is black: it feeds on the lichens which grow on trees. I am unacquainted with this caterpillar, and have made the best I can of Guenée's brief description.

The MOTH appears on the wing in July: two specimens have been taken by Mr. Sidebotham in the north of England, but I have neither seen these nor any other British examples. (The scientific name is *Bryophila Algæ*.)



424. The Scarce Marveil-du-Jour (*Diphthera Orion*).

424. THE SCARCE MARVEIL-DU-JOUR.—The antennæ are ciliated in the male, simple in the female; the colour of the fore wings is a beautiful clear green, with four longitudinal white stripes, and three interrupted transverse black bars; the four white stripes are equidistant, the first costal and narrow, the fourth inner marginal and narrow, the intermediate ones rather broader; the first black bar is near the base of the wing, much bent and very irregular; the second is median and interrupted in the middle; the third is the broadest and most conspicuous, very much bent and slightly interrupted, it is accompanied on the outside by a smoky band; the orbicular spot is small, and is united with the median bar on its inner side; the reniform spot is outside the median bar, it is black with a white exterior border; there is a regular hind-marginal series of black and white spots, the inner portion of each being white, the outer portion black; the fringe is regularly spotted with black and white.

the hind wings are dark smoke-coloured, with a still darker discoidal spot, some transverse white lines at the anal angle, and a spotted fringe: the head is green, the eyes black, the collar black, the median area of the thorax green, the posterior margin of the thorax is divided into four lobes, all of which are black at the base, and pale green at the tip; the body is smoky-gray, with a medio-dorsal series of blackish crests, of which the third and fourth are the most prominent.

The EGG is figured by Sepp as having the shape and somewhat the appearance of an Echinus, or sea-urchin, having twenty ribs, which, instead of being perfectly direct, are slightly waved; there are also a great number of delicately minute transverse lines. Mr. Crewe has described the CATERPILLAR. He says, "Whilst staying in Hampshire, I took a female *D. Orion;* as she was slightly worn and chipped, I kept her in the hope of obtaining eggs. In this I was not disappointed, and the young caterpillars fed well till their last moult on birch (*Betula alba*). They then, without any apparent reason, began to die off. I then introduced some twigs of oak (*Quercus robur*), for which the birch was entirely deserted, but out of a numerous brood I only succeeded in obtaining four chrysalids. I am inclined to think that in a state of nature the caterpillar feeds indiscriminately on oak and birch, wandering from one to the other. I never but once beat the caterpillar; this was in Suffolk, where I thrashed it out of a birch bush in a wood near Ipswich, and thence it was that I fed my young caterpillars solely on birch." The following is a description of the caterpillar: the back is bluish-black; on the fourth, sixth, and ninth segment respectively is a large primrose-yellow blotch, and smaller ones of the same colour on the third and anal segments; on the second and third segments are the rudiments of two central primrose-yellow dorsal lines: the dorsal and lateral segmental divisions are girt with a belt of orange and primrose-yellow tubercles surmounted by tufts of pale reddish hair; the sub-dorsal lines are primrose-yellow, interrupted and studded with various sized primrose-yellow spots; the lateral lines are four or six in number, black interrupted with yellow and orange, the intermediate spaces being yellow; the head is black, slightly marked with yellow; the belly is dirty-gray, spotted and marked with black and white; the legs and claspers are yellowish, with black markings: it is full-fed in September, and then strongly resembles the caterpillar of the satin moth (*Liparis Salicis*). The CHRYSALIS is enclosed in a cocoon of gnawed bark, or rotten wood; it is of a dull red colour.

The MOTH appears on the wing in June, and has been found in the New Forest in Hampshire, near Maidstone in Kent, near Brighton, and in the Weald of Sussex, and especially near Ipswich. I have no record of its occurrence in Scotland or Ireland. (The scientific name is *Diphthera Orion.*)

Obs.—I have given two very different figures of this most beautiful moth, and I find two descriptions of its caterpillar equally different: it is very probable that there are two species combined under one name, and require separation; the late eminent naturalist, J. F. Stephens, was decidedly of this opinion, and called one of them *Diphthera Orion*, and the other *Diphthera Runica* (see *Illustrations of British Entomology, Haustellata*, vol. iii. p. 46), but entomologists have hitherto declined to accept them as species.



425. The Dark Dagger (*Acronycta tridens*).

425. THE DARK DAGGER.—The antennæ

are rather short, and are simple in both sexes; the fore wings are gray, with various black linear markings: the principal of these are, first, an irregular cross, which bears a fancied resemblance to a Greek *psi* placed sideways ⊬, and is situated near the anal angle; exactly intermediate between this and the tip of the wing is a much smaller mark of the same shape: the reniform and orbicular spots are very vague and obscure; the orbicular has a very delicate black border on its outer side only, the reniform has a similar black border on its inner side only, and this is double at its lower extremity; these two semicircular markings are placed back to back, and are connected by a short and straight black line; together this constitutes the second principal marking; the third is a strong black line, which proceeds from the base of the wing almost to its middle, and which emits three or four lateral branches: the hind wings are nearly white with darker wing-rays and a spotted fringe: the head, thorax, and body are gray; a black line originating in each palpus, passes along the head including the eye, and along the thorax just above the base of the wing.

The CATERPILLAR does not roll in a ring, or feign death when disturbed. The body is somewhat incised at the interstices of the segments, hairy, and having a conspicuous hump on the fifth and twelfth segments. The head is black and shining, but emitting so many hoary hairs as to give it a gray appearance. The body is black, beautifully ornamented with orange and snow-white markings; the second segment is black, with a small median white spot on the back; the third and fourth segments are slightly swollen on the back, the centre of each swelling being orange-yellow; on each side of each of these segments is also a bright orange spot; the fifth segment has a conspicuous median hump, velvety-black on the summit, but hoary behind, and having one white spot on each side; a little distance below this is a pair of white spots closely approximate, and on each side of them a larger orange spot; on the sixth, seventh, eighth, ninth, tenth, and eleventh segments is a median stripe, rather narrowed, entire, and of an orange-yellow colour, in the centre of each segment, rather dilated, longitudinally divided, and dingy-white in the interstices; on each side of each segment, below this median stripe, are two white spots, one above the other, like the colon in printing, and there are three orange spots of different forms below the lower of these white spots; the twelfth segment is decidedly humped, and has a conspicuous snowy-white mark on the summit, shaped something like a cross, but the hinder radius of the cross is sometimes wanting; the hind margin of this segment has a broad orange border; the thirteenth segment terminates in a kind of horn, quite black and directed backwards: below the lateral series of orange spots I have described is a lateral stripe mottled with yellowish markings, among which are situated the spiracles, and below this again is a slender interrupted orange stripe. It feeds on whitethorn (*Cratægus oxyacantha*), blackthorn (*Prunus spinosa*), and some other trees and shrubs. When full-fed in September and October, it spins a silken cocoon on the trunks of trees, concealing itself in crevices of the bark, and therein changing to a CHRYSALIS, in which state it remains throughout the winter.

The MOTH appears in June; the caterpillar has been taken in many English counties, and also in Ireland. (The scientific name is *Acronycta tridens*.)

1. *Obs.*—The beautiful variety represented by the second figure is in the rich cabinet of Mr. Greening, and has been kindly lent me purposely to figure in this work.

2. *Obs.*—I do not know why this insect is called the "Dark" Dagger: it is no darker than the "Gray" Dagger; but I have an insuperable objection to changing a name. I may, perhaps, be allowed, in this place, to express a hope that my younger readers, for whose accommodation the English names are introduced, will endeavour to learn the Latin or scientific names which are now in universal use among entomologists.



426. The Gray Dagger (*Acronycta Psi*).

426. The Gray Dagger.—The antennæ are rather short, and are simple in both sexes; the fore wings are gray, with various black linear markings: the principal of these are, *first*, an irregular cross, which bears some small resemblance to a Greek *psi* placed sideways ←, and is situated near the anal angle: exactly intermediate between this and the tip of the wing is a much smaller mark of exactly the same shape: the reniform and orbicular spots are vague, but perceptible; the orbicular has a very delicate black border on its outer side only, the reniform has a similar black border on its inner side only, and this black border is double at its lower extremity; these two semicircular markings are placed back to back, and are connected by a short black line; together they constitute the *second* principal black marking; the *third* is a strong black line which proceeds from the base of the wing almost to its middle, and which emits three or four lateral branches: the hind wings are nearly white with darker wing-rays, and a spotted fringe: the head, thorax, and body are gray; a black line originates in each palpus, and passing along the head, includes the eye, and along the thorax just above the base of the wing.

The head of the caterpillar is rather wider than the second segment; the body is hairy with parallel sides, but humped on the back; the first hump is slender, long, erect, horn-like, and seated on the fifth segment; the second hump is shorter, broader, and on the twelfth segment. The head is black, hairy, and shining; its divisions very convex; the second segment is black, with a very narrow median yellow line: the third, fourth, sixth, seventh, eighth, ninth, tenth, and eleventh segments have a broad median yellow stripe, and there is a median square spot of the same colour on the hinder part of the twelfth segment; the horn-like hump on the fifth segment is intensely black, and clothed with crowded short black hairs, intermixed with scattered long ones; on each side of the median stripe is an equally broad jet-black stripe, and in this, on every segment, from the fifth to the twelfth, both inclusive, are two transverse bright red spots, with two minute whitish warts between each pair, the warts emitting black bristles: below the black stripe, on each side, is a broad gray stripe emitting gray hairs, and including the black spiracles; this gray stripe is reddish on the anterior segments, the intensity of the red increasing towards the head. The belly, legs, and claspers are dingy flesh-coloured. It feeds on whitethorn, pear, and a variety of other trees, and is full-fed in September, when it spins a whitish cocoon in the crevices of the bark of trees, and therein changes to a chrysalis, in which state it remains throughout the winter.

The moth appears in June, and is common everywhere. (The scientific name is *Acronycta Psi.*)

Obs.—I am quite unable to distinguish by words between this and the preceding species, but am convinced they are distinct, from the great difference of the caterpillar: in my specimens, the reniform and orbicular spots are more clearly defined in *Psi* than in *tridens*; they are very obscure and difficult to trace in both, but *Psi* has most decidedly the advantage in this respect. Mr. Doubleday, whose almost instinctive perception and appreciation of difference is familiar to all who know him, says that he finds little difficulty in distinguishing the two insects in their perfect state; but I am little fortunate, or, more properly speaking, less gifted in the power of discrimination, and never pronounce on either with feelings of certainty.



427. The Miller (*Acronycta leporina*).

427. THE MILLER. — The antennæ are simple, but rather stout; the fore wings are gray, with three principal black spots on the costa, the middle one of which descends in an elongate linear form towards the middle of the wing, which it almost reaches; beyond the third black costal spot is a transverse zigzag oblique black line; the fringe is very distinctly spotted: the hind wings are nearly white, with a marginal series of black dots: the head, thorax, and body are gray.

The CATERPILLAR, when disturbed, falls off its food-plant, and for a short time feigns death, lying in a semicircular posture; but its outline is concealed by the length of its hairs: its colour is pale delicate green, completely covered with long curved silky hairs, all of them directed backwards; these hairs are either hoary white or delicate pale canary-colour, or more decidedly yellow, and the body has a tendency to similar variation in colour, although its normal tint is green: there are small erect fascicles of short black hairs on the back of the fourth and sixth segments, and single erect black hairs in a row on both sides. It feeds on birch (*Betula alba*), and is full-fed towards the end of September, when, concealing itself in a crevice of the bark, it makes a little excavation, in which it changes to a CHRYSALIS, and remains in that state all the winter. In confinement, it will gnaw a hole in cork, or touch-wood, about the circumference of its body, and after entering, gum up the mouth of the hole, so that its ulterior proceedings are completely concealed; but in this retreat it changes to a CHRYSALIS, and remains in that state throughout the winter.

The MOTH appears in June, and occurs occasionally in all our English counties, but is always considered a rarity. Mr. Birchall reports it as common in the counties Wicklow and Kerry, in Ireland. (The scientific name is *Acronycta leporina*.)

Obs.—Two supposed species represented by the first and second figures are here included under the name *Leporina:* these are *A. le porina* of Stephens (*Illustrations of British Entomology, Haustellata,* vol. iii. p. 35), and *A. bradyporina* of Stephens (*Id.* vol. iii. p. 36); the third figure represents a beautiful variety in the rich collection of Mr. Bond, which has been lent me expressly for this work.



428. The Sycamore (*Acronycta Aceris*).

428. THE SYCAMORE.—The antennæ are rather stout, but simple in both sexes; the fore wings have the costal margin straight, the hind margin very slightly scalloped; their colour is pale gray, streaked and mottled with smoky-gray; the orbicular spot is clearly defined, the reniform more vague, and confused with the other mark-

ings; there is a hind-marginal series of eight black dots, and opposite each of these the gray fringe is interrupted by a smoke-coloured streak: the hind wings have the hind margin slightly scalloped; they are white, occasionally but not constantly, with black wing-rays: the head, thorax, and body are uniformly gray.

The EGGS are laid in July, but whether on the leaves, twigs, or trunk of the food-plant, I am unable to state with any certainty. The CATERPILLAR is full-fed in August and September, and then if annoyed, rolls itself into a compact ring, with the head on one side like an *Iulus*; and in this position it remains for a long time most pertinaciously. The head is as wide as the body, wider than the second segment; the body is almost uniformly cylindrical, densely clothed with long hairs, which on each segment converge at the extremities: along each side is a slender skinfold passing immediately below the spiracles: the head is black and shining, with a white mark on the face, shaped like an inverted letter V; the labrum is white. The body is pale gray, sometimes approaching to flesh-colour, and sometimes having a tinge of smoke-colour, especially near the head, with a medio-dorsal series of kite-shaped, snow-white spots; eight of these, those from the fifth and the twelfth segments, both inclusive, are bordered with intense velvety-black; three others, those on the second, third, and fourth segments, are linear and almost confluent, but still bordered by the same intense black; on the thirteenth segment the black is present, but the white is wanting: the converging hairs form a double series of dorsal fascicles, each series composed of nine fascicles, and arranged on each side of the medio-dorsal ornamentation just described; these fascicles are usually of a uniform dingy orange-red or salmon-colour, but in some specimens are ochreous-yellow; in one specimen I have examined, six of these fascicles were salmon-coloured, and the rest ochreous; all the other hairs on the body are ochreous; the spiracles are black, the legs nearly black; the claspers dark brown. This caterpillar feeds on the sycamore (*Acer pseudoplatanus*), often on the loftiest branches; also on the horse chestnut (*Æsculus hippocastanum*), and more rarely on the oak (*Quercus robur*): when these beautiful and very conspicuous caterpillars are full-fed, they may be observed crawling down the trunks in order to undergo pupation, which takes place in a web on the surface of the ground, amongst fallen leaves, under loose bark, &c.: it remains in the chrysalis state all the winter.

The MOTH does not appear on the wing until June, generally between the 8th and the 23rd, when it may occasionally be found resting on the trunks of the sycamores. It occurs every year all round London, and also in the eastern and south-eastern counties, as at Ipswich, Norwich, Stowmarket, Colchester, Maidstone, Lewes, Worthing, and Brighton, and Mr. Birchall records its occurrence in the county Galway, in Ireland. (The scientific name is *Acronycta Aceris*.)

Obs.—The second figure represents an uncommon variety in Mr. Bond's collection, in which the entire surface of the fore wings is suffused with ochreous-brown.



429. The Poplar Gray (*Acronycta megacephala*).

429. THE POPLAR GRAY.—The antennæ are rather short and rather slender; they are simple in both sexes: the fore wings are pale gray, mottled with darker or smoky-gray; the orbicular spot is clearly defined, the reniform is vague and amalgamated with a large pale blotch nearer the tip, and this large blotch is also vague and its boundaries undefined: the hind wings are white with smoky wing-rays, and not unfrequently also with two very vague and indistinct smoky transverse bars: the head and thorax are very dark gray, the body pale gray.

The CATERPILLAR rests on the surface of a leaf in a curved posture, the head being

turned on one side and brought into contact with the side of the tenth segment: it frequently spins together the edges of two poplar leaves, and thus conceals itself from observation, generally, however, maintaining the bent posture. The head is porrected, and much wider than the second segment; indeed, so large as to justify the name of "megacephala," probably given to the species on this account; the body is rather depressed, of nearly uniform width, and has the divisions of the segments clearly marked; it has several series of small warts, each of which emits a few hairs. The anal claspers are rather long and spreading. The colour of the head is whitish, with a large and almost circular black blotch on each cheek; this is enclosed in a whitish circle, and this again in a black circle; the clypeus is included in a black V-shaped mark; the dorsal area of the body is smoky-black with a slender medio-dorsal line extending from the head to the fifth segment; the second, third, and fourth segments have a whitish spot on each side of this median line; the fifth segment has a white spot and a red spot on each side of it; the sixth, seventh, eighth, ninth, and tenth segments have each two longitudinal compound marks, each composed of four closely approximate spots, the first of which is white, the second and third reddish, and the fourth white; the eleventh segment has a medio-dorsal whitish blotch, and the twelfth segment four white spots; the thirteenth segment and its claspers are dingy-white; the ventral area, legs, and ventral claspers are pale smoke-colour, tinged with pink. The caterpillar feeds on several species of poplar. I found it commonly on the tacamahack poplar (*Populus balsamifera*), at Leominster, in July and August, 1866; in the latter month it appeared to be full-fed. In order to undergo pupation, it creeps into the very smallest chinks of the bark of the trees on which it has been feeding: Mr. Greene gives the following directions for finding the chrysalis:—"Break off every bit of loose bark with the point of the trowel, and the chrysalis-case, which with the chrysalis closely resembles that of *Acronycta Psi*, will be found firmly glued to the surface: the cocoon is formed of decayed wood." Guenée also informs us that the readiest way to obtain this species is to search the bark of poplars and aspens.

The MOTH appears in June, and is of common occurrence in most of our English counties. Mr. Birchall says it is also common in Ireland. (The scientific name is *Acronycta megacephala.*)



430. The Grisette (*Acronycta strigosa*).

430. THE GRISETTE. — This insect is smaller and more slender than its congeners: the antennæ are very slender; the fore wings are pale gray, marbled with smoky-gray, and having at the base of the inner margin an ochreous linear patch, the two combining to form on the closed wing an ochreous spot at the base of the thorax: the costal and hind margins are spotted with smoke-colour; the orbicular and reniform spots are distinct, and there is a conspicuous angled line between the reniform spot and the hind margin: the hind wings are very pale gray, with a rather darker but still very pale discoidal spot, and transverse median bar: the head, thorax, and body are gray.

The EGGS are laid at the end of June, on the twigs of whitethorn, more particularly in old whitethorn hedges, growing in chalky districts throughout the neighbourhood of Cambridge; the CATERPILLAR emerges in July, and is usually full-fed at the end of August, or beginning of September. The head is porrected, flat, of about the same width as the second segment; the body is of nearly uniform width throughout; the segments are strongly pronounced, and the divisions between them deeply incised; there is a double series of bristle-bearing warts down the back—two each on the third, fourth, sixth, seventh, and tenth segments; four each on the fifth, eighth, ninth, eleventh, and twelfth segments. The colour

of the head is umber-brown, with very dark reticulations on the cheeks; the colour of the body is delicate apple-green, with a well-marked medio-dorsal stripe, of a rich purple-brown colour; this is dilated on the second segment immediately behind the head, also on the fifth, eighth, and ninth segments; thence it decreases in width, and on the twelfth and thirteenth segments is very narrow; the spiracles are white, in a brown ring; the legs and claspers green, red-brown at the extremities; when full-fed, it spins together any dead leaves or rubbish within its reach, or buries itself in decayed wood, if it have the opportunity; and thus concealed it changes to a CHRYSALIS, and remains in that state throughout the winter.

The MOTH appears on the wing during June and July. I have received it from Cambridge, but know of no other locality. (The scientific name is *Acronycta strigosa.*)



431. The Alder (*Acronycta Alni*).

431. The fore wings are gray, with a very large dark brown, almost black, blotch which occupies nearly half of the wing, extending from the middle of the base to the hind margin, near the anal angle, and covering all the inner margin, excepting a very small space at the basal, and another at the anal angle, both of which are gray: this dark blotch has also a broad band or branch, which connects it with the middle of the costal margin: the areas not occupied by this blotch are two, the *first* occupying broadly the basal half of the costal margin, the *second* being somewhat triangular and apical, both of them are beautifully marked with darker shades; the fringe is spotted; the reniform spot is indicated by a pale gray outline; the orbicular is scarcely perceptible; the hind wings are white, with smoky discoidal spot, wing-rays and apical angle, the fringe is spotted; the head is gray, the antennæ and eyes black; the thorax gray, with a black streak at the base of the wings; the abdomen gray, inclining to smoky.

The CATERPILLAR rests in a nearly straight position, and does not fall from its food-plant when disturbed, or exhibit any symptoms of uneasiness when handled; its head is about equal in breadth to the second segment, and intensely glossy; the body is almost uniformly cylindrical, the segmental divisions clearly indicated The colour of the head is black, of the body intense purple-black, without gloss, and having in most specimens a medio-dorsal series of yellowish markings, one on each segment; these are transverse and oblong, and in many specimens bordered with white; the presence of these markings is not constant, and some entomologists have figured the caterpillar only exhibiting these on the second and twelfth segments; each segment has a process or appendage on each side resembling a black horse-hair dilated and flattened at the tip: the appearance of these appendages is so remarkable that it is impossible to mistake this caterpillar for any other; when full-fed, it sometimes spins together the leaves of its food-plant; sometimes it excavates a dead bramble stick; and in either situation changes to a CHRYSALIS of a rich deep chestnut-brown colour. With regard to the food-plant of the caterpillar, there is considerable doubt; it has been found in confinement to eat whitethorn (*Cratægus oxyacantha*), and alder (*Alnus glutinosa*), but I am not certain whether it has been ascertained to eat either of these in a perfectly natural condition.

The MOTH appears in June, and has been found occasionally in most of our English counties, and Mr. Birchall records the occurrence of a single specimen from the county Wicklow, in Ireland, but it has always been regarded as a great rarity. (The scientific name is *Acronycta Alni.*)

Obs.—The extraordinary caterpillar of this moth has no affinity with any others of the genus; indeed, the great diversity in the caterpillars of the *Acronyctæ* is very remarkable.



432. The Coronet (*Acronycta Ligustri*).

432. The Coronet.—The antennæ are simple, but stouter in the male than in the female; the colour of the fore wings is dark rich brown, sometimes with a tinge of green, and always marbled and mottled; the orbicular spot is indicated by a white outline; the reniform has a white exterior border, and beyond it is a large whitish blotch, which has a double black outline: the hind wings are brown-gray: the thorax, like the fore wings, is marbled with dark brown and white; the body, like the hind wings, is brown-gray.

The caterpillar will not roll in a ring when handled. The head is of a delicate green, almost transparent, and very shining; the mouth dark brown, or almost black. The body is of a glaucous-green, with a very narrow median white stripe down the back, not always extending to the second or thirteenth segment; there is another stripe, rather broader than the median stripe, and of a yellowish white on each side, extending from the head the entire length of the caterpillar; this is about equidistant between the dorsal stripe and the spiracles; each segment emits eight, ten, or twelve delicate silky-looking bristles. It feeds principally on ash (*Fraxinus excelsior*), but also sometimes on privet (*Ligustrum vulgare*), and is full-fed towards the end of September, when it buries under the moss growing on the trunks of ash-trees. Mr. Greene says the chrysalis is to be found abundantly in such situations, and directs that the moss must be torn off very carefully, when the chrysalis-case, which is black and very tough (not hard), will, in most cases, be found adhering to the moss; if there be no moss, examine the trunk. There are often long perpendicular slits in the bark of ash-trees, and this is a favourite retreat of this species.

The moth appears on the wing in June and July, and is considered moderately common both in England and Ireland. (The scientific name is *Acronycta Ligustri*.)



433. The Knot-Grass (*Acronycta Rumicis*).

433. The Knot-Grass.—The antennæ are simple in both sexes, but rather stouter in the male; the colour of the fore wings is dark gray, marbled and mottled with black: the orbicular and reniform spots are visible in outline, but are indistinct; there are two rather small and closely approximate white spots placed transversely near the hind margin at two-thirds of the distance between the base and anal angle: the hind wings are brown-gray, the base and fringe being paler: the thorax is mottled and marbled with pale gray, almost white, and dark gray, almost black: the body is brown-gray.

The eggs are laid on the leaves of very many low herbaceous plants in May or June, and the caterpillar is full-fed by the second week in July: it then rests in a nearly straight position, but with the head somewhat bent under the anterior segments: when annoyed, it falls from its food-plant feigning death and rolls in a ring, but very soon unrolls and commences crawling with some rapidity. The head is rather narrower than the second segment; and manifestly narrower than those which follow; the body is obese, the segments swollen, the incisions between them deep; on every segment is a transverse series of ten warts, all somewhat dilated and flattened, and each emitting a fascicle of spreading bristles. The colour of the head

is black with clearly defined rich brown markings on each side, and a brown mark on the face in the form of an inverted letter V: the body is richly adorned with diversified colours, somewhat after the fashion of tesselated pavement: each segment from the fourth to the twelfth, both inclusive, has on its anterior margin a medio-dorsal orange spot, on each side of which is an intensely black velvety spot; these two being connected behind the orange spot, and completely enclosing it: on each side of the black spot is a somewhat quadrate pure white spot, the hinder margin of which terminates in a wart, also white; the lateral surface below the series of white spots is smoke-colour delicately lined and irrorated with burnt-sienna brown; this lateral region contains the spiracles, which are pure white surrounded with intense velvety-black; there are also on each segment three warts, two of which are above the spiracle and brown, the third below the spiracle and orange-red, being seated in a conspicuous spot of the same showy colour; below the spiracles and extending from the fifth to the twelfth segment is a zigzag and moderately wide pure white stripe, interrupted by the orange spots just described; the posterior half of the dorsal surface of each segment is orange-brown irregularly lined with black; the ventral surface, legs, and claspers are smoke-coloured, approaching to pitchy-red: the fifth wart on each side is situated at the base of a clasper or in a corresponding site, when the clasper is absent; it is smoke-coloured; all the bristles are red-brown. It feeds on the common knot-grass (*Polygonum aviculare*), dock, and strawberry, both wild and cultivated, and many other plants: it is particularly fond of those strawberries which are cultivated under the name of "alpine:" when full-fed, it spins a cocoon near the ground and therein turns a CHRYSALIS, and remains in that state during the winter.

In May and June the MOTH appears on the wing, and is very common both in England and Ireland, and Mr. Douglas Robinson informs me it is taken in Kirkcudbrightshire, in Scotland. (The scientific name is *Acronycta Rumicis*.)

Obs.—Mr. Greening, of Warrington, had bred a considerable number of this species, smaller and darker than usual; and has most kindly presented some to me for figuring in this work: this variety is represented in the second figure.



434. The Scarce Dagger (*Acronycta auricoma*).

434. THE SCARCE DAGGER.—The antennæ are simple; the colour of the fore wings is dingy-gray mottled with darker markings, but all of them confused and indistinct; the orbicular spot is surrounded by a paler ring, and usually has a black dot in the centre; the reniform is scarcely discernible; there is a black streak at the base of the wing and another near the anal angle, both very obscure: the hind wings are pale brown-gray with pale gray fringe: the head and thorax are of the colour of the fore wings; the body of the colour of the hind wings.

The CATERPILLAR rests in nearly a straight position, but falls off its food-plant, assuming a crescentic form when disturbed; its head is manifestly narrower than the second segment, into which it is partially received when at rest, but porrected when crawling; the body is of nearly equal size throughout, but exhibits the division of the segments in a very decided manner; each segment has six or eight warts, each of which emits a fascicle of radiating hairs; four of these warts forming a square on the back, are more conspicuous than the rest; on the thoracic segments the dorsal warts form a transverse series: the head is black and shining; the body smoky-gray with a broad black band round each segment; the warts are orange-coloured, the hairs they emit are yellowish; the spiracles are white; the ventral is paler than the dorsal area, but of the same smoky-gray colour. It feeds on bramble (*Rubus fruticosus*) and is full-fed the

middle of July, when it spins a silken cocoon on the underside of a bramble-leaf, and therein turns to a dark brown CHRYSALIS.

The MOTH appears in about a fortnight and is extremely local, being almost confined to the counties of Kent and Sussex. (The scientific name is *Acronycta auricoma.*)

Obs. Mr. Doubleday thinks this species may be double-brooded : the moth certainly appears in May from chrysalids of the preceding autumn.



435. The Light Knot-Grass (*Acronycta Menyanthidis*).

435. THE LIGHT KNOT-GRASS.—The antennæ are simple, but stouter in the males than in the females ; they always possess an ochreous tint : the colour of the fore wings is pale gray with black markings, as follows :—at the middle of the base is a short streak which generally unites with an angulated transverse line crossing the wing very near the base ; beyond the middle is a second and bent line ; between these two lines are the two discoidal spots, the orbicular is generally a small and perfectly circular ring, but sometimes it is a solid spot having no pale central area ; the reniform is large but less clearly defined ; the hind-marginal area of the wing is darker than the median or basal areas : the costal margin and fringe are spotted : all these markings are subject to be suffused and indistinct : the hind wings are brown-gray with a whitish fringe : the head is gray ; the thorax gray, with a black line on each side at the base of the wing ; the body is gray.

The CATERPILLAR rests in a nearly straight position on the twigs of the sweet-gale (*Myrica gale*), on the leaves of which shrub it feeds : the head is rather narrower than the second segment ; the body is of almost uniform substance throughout, and rather obese, the segment swollen in the middle, the incisions between them very decided ; each segment has a transverse series of warts, and each wart emits a radiating fascicle of longish hairs : the colour of head, body, legs, and claspers is black, excepting the warts which are bluish, the spiracles which are white, and an interrupted stripe below them which is bright red.

The MOTH appears on the wing in June, and has occurred in most of those boggy districts in England where the sweet-gale grows. (The scientific name is *Acronycta Menyanthidis.*)

Obs. I am indebted to Mr. Bond for the loan of the beautiful varieties represented in the third and fourth figures.



436 The Sweet-gale Moth (*Acronycta Myricæ*).

436. THE SWEET-GALE MOTH.—The antennæ are slender and simple ; the costal margin of

the fore wings straight, the tip rather prolonged and rather pointed, the hind margin rather oblique; their colour is dark lead-coloured gray, mottled and marbled; at the base of the inner margin is a slender dash of white; the orbicular and reniform spots are visible in outline only; the fringe is spotted: the hind wings are white in the male with darker wing-rays and a marginal series of dark dots: dark smoky-brown, almost black, in the female, with white fringe: the head, thorax, and body are of the same colour as the fore wings.

The MOTH appears on the wing in May and June, and occurs plentifully at Rannoch, in Scotland, and has also been taken at Killarney, in Ireland, but hitherto not in England. (The scientific name is *Acronycta Myricæ*.)



437. The Powdered Wainscot (*Simyra venosa*).

437. THE POWDERED WAINSCOT.—The antennæ are almost simple in both sexes, but those of the male are rather stouter than those of the female: the fore wings are slightly arched on the costa, and very sharply pointed at the tip; their colour is white, approaching to cream colour, with a narrow longitudinal stripe of dark brown originating at the base of the wing, and running along the middle of the wing, but not quite reaching the hind margin: the whole area of the wing is more or less thickly sprinkled with brown dots: the hind wings are snowy white: the head and thorax are creamy white, the body snowy white.

The EGG is laid on the leaves and stems of the common reed (*Arundo Phragmites*), in June, and the young CATERPILLARS emerge in about fourteen days and feed on that plant.

The full-grown caterpillar rests in a nearly straight position on the reed, but when annoyed rolls itself in a very compact ring and falls to the ground. The head is rather narrower than the body, and very glabrous; the body is cylindrical with the segmental divisions clearly indicated, and each segment has a transverse series of prominent warts, each wart crowned with a fascicle of radiating hairs. The colour of the head is black, with a white V-shaped mark on the face, two whitish lines on the crown, a whitish blotch in the middle of each cheek, and a conspicuous white base to the antennal papillæ; the colour of the body is varied; there is a broadish but irregular medio-dorsal black stripe, then a lateral stripe of a creamy-white colour, in which are situated two reddish warts in each segment, the bristles emitted by the warts being black; then follows a broad gray or mottled stripe on each side; this is really composed of black and white spots, the mixture of which gives the gray colour, this stripe also contains a wart on each segment, and below this wart a white spiracle; below this broad mottled stripe is the skin-fold, which is white with a reddish wart-like spot on each segment; the ventral area is honey-yellow, the legs variegated and shining; the claspers honey-yellow tinged with green, semi-transparent, and without gloss. When full fed it draws together the edges of one of the broad leaves of the reed and spins a perfectly white cocoon on the upper surface of the leaf, but before this habitation is finally closed, it collects a number of fragments of the leaves, and in some instances those of smaller grasses, and laying them side by side with much care, skill, and neatness, binds them together with silk, and thus forms a kind of roof to protect the cocoon in which it changes to a CHRYSALIS, and in which also it has to pass the winter.

The MOTH appears on the wing about midsummer, and has been found only in the fen districts of Cambridgeshire. Both the caterpillar and cocoon are very conspicuous objects on the reeds, and both, as well as the perfect insect, exhibit many striking similarities to some of the Ursines. (The scientific name is *Simyra venosa*.)



438. The Brown-line Bright-eye (*Leucania conigera*).

438. The Brown-line Bright-eye.—The antennæ are slightly ciliated in the male, simple in the female : the fore wings have the costal margin very straight, the tip almost pointed; their colour is raw sienna-brown with two slender transverse umber-brown lines, the first of which originates on the costa at about a quarter of the distance from the base towards the tip; it runs obliquely nearly to the middle of the wing, and then turns abruptly to the inner margin, and joins it at a third of the distance between the base and anal angle ; the second originates on the costa at three-fourths of its length, and runs obliquely towards the inner margin, and joins it at two-thirds of the distance between the base and anal angle ; the orbicular and reniform spots are between these two lines, the orbicular scarcely perceptible, the reniform very conspicuous and shaped something like the letter S, the upper portion being ochreous, the lower brilliantly white: the hind wings are gray-brown with a brick-dusty tinge: the head and thorax are of the same colour as the fore wings, the body of the same colour as the hind wings.

The caterpillar has been found in May, and is described in the third volume of the *Entomologists' Monthly Magazine*, by Mr. Buckler. Six specimens were received by that gentleman, three of them of a bright ochreous tint, and the other three were of an almost uniform gray colour. It is nearly cylindrical in form, but tapers slightly at the anterior extremity : in the ochreous variety, Mr. Buckland says, "The colour of the back is deep ochreous, the dorsal line pale sulphur-yellow, enclosed on either side by a black line, and well defined in its entire length. The sub-dorsal line rather broad, of equal width, and uninterruptedly black throughout, followed by a pale yellow line, finely edged below with black; next, a stripe of pale ochreous, then another pale yellow line finely edged above with black, and followed by a broad stripe of deep ochreous, and broadly edged with black, both above and below, the black spiracles being along the lower edge. Above the legs is a stripe of pale dull ochreous, the belly and claspers being slightly darker, the anterior pairs of black dots visible only on the back of each segment. The head is brownish, streaked, and mottled with black. The other variety is of a brownish-gray tint, with all the lines and stripes less distinct, but all disposed in the same order as above described ; but the yellow lines of the former are, in these, represented by lines of gray, and the ground colour of the back is brownish-gray." It feeds on several grasses, preferring that plague of the gardener called couch-grass, spear-grass, or squitch (*Triticum repens*), and is full fed at the end of May.

The moth appears on the wing in July; it is common and generally distributed in England, Scotland and Ireland. (The scientific name is *Leucania conigera*.)



439. The Delicate (*Leucania vitellina*).

439. The Delicate.—The antennæ are very slightly pubescent in the male : the fore wings are straight on the costa and rather blunt at the tip; their colour is delicately pale ochreous, the reniform spot and three slender zigzag transverse lines being slightly darker, indeed, tinged with brown ; the first of these transverse lines crosses the wing half way between the base and the reniform spot, and is nearly direct, but very indistinct, indeed scarcely perceptible; the second and third are very

oblique, and divide the area between the reniform and hind margin into three nearly equal parts; the wing-rays are slightly darker than the ground colour: the hind wings are very pale ochreous white, the wing-rays are slightly darker: the head and thorax are of the most delicate ochreous; the body silky.

The CATERPILLAR has been minutely described and most carefully figured in Boisduval's *Collection des Chenilles;* and I can obtain no information respecting it from any other source: it rests on a blade of grass in a perfectly straight position; the head is small, manifestly narrower than the second segment; the body is nearly uniformly cylindrical from the fourth segment to the eleventh but tapers at both extremities; the colour of the head is ferruginous-brown reticulated with black; of the body a very pale reddish brown; there are two narrow white stripes on each side, and each of these stripes is slightly interrupted at the incisions of the segments, and also bordered on both sides with pale brown; below these are the spiracles quite black, and below the spiracles is a broader stripe very pale, but not so nearly white as those already described; and below this is a pale brown stripe which touches the legs and claspers; the ventral is paler than the dorsal area, and the legs and claspers are concolorous with the belly: the text describes the first and last segments as having a reddish dorsal plate, but the figure does not exhibit this character. It is found during winter and at the beginning of spring feeding on grasses, and undergoes pupation in February, March, and April, buried in the earth, but without spinning a cocoon: the CHRYSALIS is of a dull reddish-brown colour, and is furnished at the caudal extremity with a number of small hooks, two of which are larger than the others, distant from each other and parallel.

Two specimens only of this delicate insect have been taken in England, both of them at Brighton, by Mr. Thorncroft, who has kindly presented one to my collection with the view of offering all entomologists the opportunity of examining it. (The scientific name is *Leucania vitellina.*)



440. The Double-line (*Leucania turca*).

440. THE DOUBLE-LINE.—The antennæ are very slightly pubescent in the male, simple in the female: the fore wings are dull brick-dust red with two transverse dark brown lines: the first is slightly waved, but its direction is nearly straight; the second is oblique and slightly waved near the inner margin; the orbicular spot is wanting; the reniform spot is narrow, crescentic and whitish: the hind wings are brown in the disk, reddish round the margins: the head and thorax are of the same colour as the fore wings, the body of grayish brown, more or less inclining to brick-dust red.

Guenée says that the CATERPILLAR is of a yellowish gray colour, with a slender whitish medio-dorsal stripe, and a lateral stripe in the region of the spiracles which divides the caterpillar into two colours, the whole of the ventral being decidedly paler than the dorsal area; there is also a very imperfect series of dorsal lozenges, which are brighter on each side: the head is pale, horny, shining, and unspotted; the spiracles are very obvious, each has a black circumscription: the legs are of the same colour as the body. It feeds in February and March on the grasses which grow in woods, more particularly on the spring wood-rush (*Luzula vernalis*), a species which does not occur under that name in the British flora. In Britain, *Luzula pilosa* and *L. campestris*, two very common species of wood-rush, are likely to be its food-plants.

The MOTH appears on the wing in June, and has been taken principally on our south coast, as at Folkestone, Rye, Worthing, Lewes, Brighton, and in the New Forest of Hampshire. It occurs at Epping, but is rare; it was formerly abundant in Hainault Forest. (The scientific name is *Leucania turca.*)

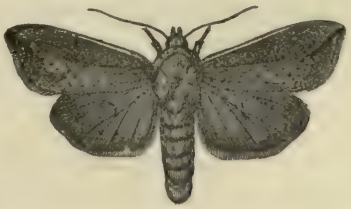


441. The Clay (*Leucania lithargyria*).

441. THE CLAY.—The antennæ are slightly pubescent in the male, simple in the female: the fore wings are reddish-gray, the red having a brick-dust tinge; there is a bent transverse series of ten or eleven brown dots curving across the wing nearly parallel with the hind margin; the orbicular spot is absent; the reniform is reduced to a small whitish dot: the hind wings are smoky-brown, the fringe paler: the head, thorax, and body, are nearly of the same colour as the fore wings.

The Rev. H. Harpur Crewe has described the CATERPILLAR in the *Zoologist* for 1861, as under:—"The ground colour is ochreous or reddish-drab, the central dorsal line slender and blackish, with a white centre; the sub-dorsal lines are broad and deep black, bordered with white on the lower side; between the dorsal and sub-dorsal lines is a very slender indistinct dusky line. The spiracles are black in a whitish ring; and between the latter and the sub-dorsal lines is a whitish waved line edged with black; between the spiracles and legs are two conspicuous yellow lines; the belly is destitute of spots or markings: the sub-dorsal lines vary much in intensity of colour: it feeds by night, in April or May, on various species of grass, concealing itself by day, and crawling up the blades as soon as it is dark: it is full-fed from the middle to the end of May. The CHRYSALIS is of a bright red colour, and is enclosed in an earthen cocoon."

The MOTH appears on the wing in July, and is common in almost every part of England, Ireland, and Scotland. It has a remarkably delicate appearance, the colours being exquisitely blended. (The scientific name is *Leucania lithargyria.*)



442. The American Wainscot (*Leucania extranea*).

442. THE AMERICAN WAINSCOT.—M. Guenée says that the species varies greatly in size, but is always larger than *Leucania lithargyria;* the circumscription of the wings is, however, altogether different, and rather resembles that of *Heliothis armigera* and *H. peltigera;* the fore wings are very pointed at the tip; their colour is gray, more or less tinged with red, but sometimes whitish, thickly sprinkled with black scales; the two discoidal spots are detached, and of a light colour, more or less tinged with red; below the reniform spot there is a white dot indistinctly surrounded with black: there is no trace of lines, but the series of black dots which represents the elbowed line, is often very distinct; an oblique black streak which originates in this series ascends to the tip of the wing, and this, in conjunction with the form of the wing, is a principal characteristic of the species: the hind wings are semi-transparent and gray, with the hind border and wing-rays blackish; there is scarcely any difference in the sexes.

The MOTH appears on the wing in September; Mr. Bond captured one specimen at sugar at Freshwater, in the Isle of Wight, on the 6th of that month, 1859. It has always been considered an American insect. (The scientific name is *Leucania extranea.*)



443. The Obscure Wainscot (*Leucania obsoleta*).

443. THE OBSCURE WAINSCOT.—The antennæ are slightly ciliated in the male, simple

in the female; the fore wings are pale wainscot-brown, the wing-rays being a shade lighter; on each side of each ray is a delicate line of darker brown, and in the interspace between the rays is a similar slender brown line. The median wing-ray has a pale, almost white spot at its extremity, and beyond this is a transverse series of eight or nine black dots; these descend as far as the third or fourth in a direct line from the costa, and then trend obliquely to the middle of the inner margin: the hind wings are almost white, with the wing-rays and an apical radiating cloud smoky-brown; on the extreme margin is a series of dark brown dots: the hind wings are pale gray with dark brown rays, and a brown cloud on the hind margin: the head and thorax are exactly the same tint as the ground colour of the fore wings; the body is much paler, almost white.

Guenée describes the CATERPILLAR as of a grayish-yellow colour with a tinge of red, which is more perceptible at the interstices of the segments where the skin is folded; there is a slender white medio-dorsal stripe, bordered on each side with deep transparent green, and also a slender whitish lateral stripe; the area between the medio-dorsal and lateral stripe is marbled, and is longitudinally divided by another broader and less clearly defined stripe; the spiracular stripe is continuous and bright; the spiracles are black with a dingy gray centre; the head is pale, reticulated with brown, and having the upper margin of the divisions darker; the neck is gray-brown with three white lines. It feeds by night, in August and September, on the leaves of the common reed (*Arundo Phragmites*), and conceals itself by day in the hollow stems of the reed, which it fills with its green excrement: at the approach of winter it loses its colour, and passes the whole of that season in the reed-stems, only changing to a chrysalis in the following spring.

The MOTH appears on the wing in June, and occurs commonly round London in reed-beds, more especially on the banks of the Thames: Mr. Birchall records its having been taken in the County Wicklow, in Ireland, by Mr. Bristow. (The scientific name is *Leucania obsoleta.*)



444. The Cosmopolitan (*Leucania Loreyi*).

444. THE COSMOPOLITAN.—The palpi are rather long and porrected, the terminal joint being short and naked: the antennæ are simple in both sexes: the fore wings are nearly straight on the costa, but slightly bent and blunt at the tip; their colour is pale wainscot-brown with a darker median dash, which extends from the base beyond the middle of the wing, and includes a white spot, which represents the reniform; a similarly coloured shade extends obliquely from the tip towards the middle of the wing, but does not reach the median dash; the upper boundary of this oblique shade is sufficiently definite, but the lower vanishes in the hind-marginal area; there is a curved series of small black dots half way between the central white spot and the hind margin; the fringe is concolorous with the hind-marginal area; the hind wings have their hind margin slightly scalloped; their colour is very pale with darker wing-rays, which, in the female, expand into undefined spots on the hind margin: the head and thorax are pale wainscot brown: the body is much paler.

The MOTH appears on the wing in July, and is common to almost all countries—the south of Europe, Africa, Asia, the islands of the eastern archipelago, and South America. In Britain it has only occurred twice, two specimens having been taken on the race-course near Brighton by Mr. Thorncroft, one of our most energetic and successful entomologists. (The scientific name is *Leucania Loreyi.*)



445. The Shore Wainscot (*Leucania littoralis*).

445. The Shore Wainscot.—The antennæ are almost simple in the male, quite so in the female: the fore wings are blunt at the tip, their colour is a most delicate isabelline brown, with a median longitudinal slender but conspicuous white line, extending from the base to the middle of the hind margin; this white line near its middle emits a short branch towards the anal angle; the sides of this white line are darker brown than the rest of the disk: the hind wings are white, the rays being slightly darker: the head and thorax are of the same colour as the fore wings, the body paler.

We are indebted to M. Mabille for our knowledge of the life-history of this species: it is published in the "Annals of the Entomological Society of France," in the first quarterly part for 1863. The EGG is laid in July among the grasses which grow on the sand-hills by the sea-side, and the young caterpillar, emerging before the winter, hybernates, burying itself in the loose sand: in early spring it eats very little and grows very slowly; it is of a very delicate constitution, and when in confinement, the accidental omission of any of the attentions necessary for its welfare, is at once fatal to its existence; as spring advances it feeds more freely, and grows more rapidly, but never thinks of leaving the vicinity of its birth-place, when its presence is rendered apparent by the abundance of its yellow-green excrement on the sand: if this be absent, the entomologist has no chance of finding the caterpillar. The full-grown caterpillar has a flattened porrected head, rather wider than the second segment, and rather broader at the mouth than on the crown; the body is nearly cylindrical, but is slightly attenuated at both extremities; the divisions of the segments are clearly defined, and the segments themselves are full and tumid; there is a glabrous plate longitudinally divided on the back of the second segment: the colour of the head is shining testaceous-brown with a white line down the face, and a white neck; the plate on the second segment is also shining testaceous-brown; the body is pale gray tinged with red, but varies in different individuals, some having a brighter tint, others are of a plain ashy-gray colour: the dorsal area is gray intersected by a narrow white medio-dorsal stripe, and bounded on each side by a compound stripe, the middle portion of which is pale, the two borders composed of elongate dark markings; this compound stripe is followed by a narrow white stripe, and this again by a narrow isabelline-brown stripe: then another white stripe and another isabelline stripe; and, lastly, there is a broad milky-white stripe, which includes the black spiracles; below this the colour is testaceous-gray, a colour which also pervades the claspers; the ventral area is tinged with green. In a state of nature, this caterpillar feeds exclusively on the maritime grass, so valuable, in an economical point of view, in binding the sandy dunes of our sea-shores, and so familiarly known under the names of "marram," "matweed," and "sea-reed" (*Ammophila arundinacea*), but in confinement it will eat sedges (*Carex riparia* and *C. sylvatica*). When full-grown, it emits a gummy fluid from its mouth, and, mingling this with the loose grains of dry sand, constructs therewith a cocoon rather larger than a partridge's egg; the grains of sand are arranged with some regularity on the outside of this cocoon, but its powers of cohesion are very limited, and the contour of the cocoon is easily disturbed: in the interior the caterpillar changes to an elongate CHRYSALIS, of a bright yellow tint, having still paler wing cases: it remains in the chrysalis state from fifteen to twenty days.

The MOTH appears on the wing in June and July, and is very local in England; it has been taken on the sand-hills at New Brighton, in Cheshire, and abundantly at Lytham, in

Lancashire, in the Isle of Wight, and on the east coast of Ireland. (The scientific name is *Leucania littoralis.*)



446. The Striped Wainscot (*Leucania pudorina*).

446. THE STRIPED WAINSCOT.—The antennæ of the male are slightly ciliated; the fore wings have the costa straight, the tip blunt, and the hind margin rather arched; their colour is ochreous, strongly tinged with a rosy hue, and thickly sprinkled with dark-brown scales which occupy the wing-rays; on the upper side of the median ray these dark scales are numerous and crowded, and form a rather conspicuous streak along the middle of the wing; they are also more crowded towards the costal and hind margins, near the latter forming decided markings which diminish to points towards the central disk: the hind wings are dingy gray-brown; the head and thorax are of the same colour as the fore wings; the base of the body is rather paler; the rest of the body inclining to a reddish tint.

The EGGS are laid on the common reed (*Arundo Phragmites*) and on several grasses on which the CATERPILLAR feeds. The full-grown caterpillar rests in a perfectly straight position and when disturbed falls off its food plant and forms a lax ring, but almost immediately unfolds to resume the straight position. The head is porrected, and of the same width as the second segment: the body is obese, cylindrical, and tapers towards the anterior extremity. The colour of the head and body is pale wainscot brown: the head being glabrous, and having darker reticulated markings, and two approximate longitudinal dark stripes on the face, which diverge at the clypeus; the body has two closely approximate but very narrow and very indistint medio-dorsal black stripes, exterior to which are numerous very delicate reticulated or rivulet markings of a smoky black colour; again, exterior to the somewhat wide space occupied by these, is a distinct double stripe on each side, of a dark smoke-colour, almost black; this has the exterior margin darker than the interior margin, and bounded by a narrow lighter stripe, which makes it still more conspicuous; exterior to this are four lateral stripes, each composed of multitudinous delicate markings, the lowest on each side containing the perfectly black spiracle; below the spiracles is a broader pale stripe, and then a delicately reticulated surface of rather a darker hue; each segment has two very small but intensely black dots on its dorsal surface, equidistant from the double medio-dorsal stripe and the next dark stripe; and ranged along each side is a series of black dots, one above and another behind each spiracle; and similar black dots occur below the lowest lateral stripe; the ventral surface, legs, and claspers, are of the same pale wainscot-brown as the general dorsal surface.

The MOTH appears on the wing in July, and and has been taken in the southern, eastern, and northern counties of England, and Mr. Birchall says it is abundant at Killarney, in Ireland. (The scientific name is *Leucania pudorina.*)



447. The Shoulder-striped Wainscot (*Leucania Comma*).

447. THE SHOULDER-STRIPED WAINSCOT.—The antennæ of the male are slightly pubescent; the fore wings are rather rounded at the tip; their colour is wainscot-brown with a whitish dash under the costa, originating at the base and extending nearly to the tip of the wing; the median wing-ray is white,

and the parallel rays running to the hind margin are pale; there is a dark brown dash beneath the median ray, and in each interspace between the parallel wing-rays is a shorter dash of the same colour: the hind wings are pale smoky brown gradually growing darker towards the fringe, which is lighter; the rays are darker: the head, thorax, and body are wainscot-brown.

The EGG is laid on cock's-foot grass (*Dactylis glomerata*) and other grasses in June, and the CATERPILLAR probably hybernates, not being full-fed until the following spring; it feeds almost exclusively by night, reposing by day near the ground, on the stem of its food-plant, in a perfectly straight position: when annoyed, it rolls itself in a compact ring, falling to the ground and remaining concealed at the roots of the grasses. The head is semi-globose, of the same breadth as the second segment; the body is almost uniformly cylindrical, slightly narrower towards the anal extremity; the anal claspers project beyond the anal flap and are slightly spreading. The head is glabrous, wainscot-brown, delicately reticulated with darker brown, and having two dark brown stripes down the face which approximate on the crown, but divide towards the mouth, enclosing the clypeus; the colour of the body is wainscot-brown, variegated throughout the dorsal surface with delicate rivulet markings, of both darker and paler brown, and having four black dots, arranged as a trapezoid, on the dorsal surface of every segment, from the fifth to the twelfth inclusive; the second segment has a semicircular semi-corneous plate, its truncated margin next the head: this is traversed by three distinct pale stripes, which are continued indistinctly throughout the entire length of the caterpillar, and are bordered with dark brown dots and shades, here and there massed into patches; the spiracles are intensely black, and immediately below them is a rather broad and very distinct pale stripe: the ventral surface is tinged with purplish semi-transparent green; the legs and claspers are of the same colour: it changes to a smooth brown CHRYSALIS beneath the surface of the ground.

The MOTH appears in June, and is found in most of our English counties, north, midland, and south; it is also common in Ireland. (The scientific name is *Leucania Comma*.)



448. The Devonshire Wainscot (*Leucania putrescens*).

448. THE DEVONSHIRE WAINSCOT.—The antennæ are slender in the males, still more so in the females; the wings are straight on the costa, blunt at the tip, slightly scalloped on the hind margin; their colour is very pale wainscot-brown, with a median longitudinal dash of dark brown, in the middle of which is a slender white lunule; there are a number of dark brown longitudinal streaks towards the hind margin, and these are separated and rendered more conspicuous by six white wing-rays: the hind wings are pearly white, with a marginal series of black dots alternating with smoky wing-rays; the head and thorax are wainscot-brown, tinged with gray; the latter has two transverse dark lines on the neck, the posterior of which emits two longitudinal branches parallel with the base of the wings, and directed towards the base of the body, which is pale gray-brown.

The CATERPILLAR has been described by Mr. Buckler in the second volume of the "Entomologists' Monthly Magazine:" it was found feeding on grass in the month of October; its colour was pale grayish ochreous, striped longitudinally after the manner of its congeners. The head is mottled with dusky-gray and ochreous, with a black streak bordering the front of each lobe, followed by a white streak on each side of the central portion: the dorsal line is whitish, conspicuous only on the second, third, and fourth segments, and afterwards nearly obliterated by the dusky edging enclosing it; and on

either side a dorsal broad stripe of mottled grayish-ochreous, followed by a pale ochreous stripe, and a grayish-ochreous darker stripe. The sub-dorsal line is whitish, very finely edged above and below with dusky grayish-brown, followed by a broad stripe of mottled ochreous, and then by a lateral whitish line, finely edged with dark grayish-brown; below this is a broad grayish-brown stripe, the spiracles being situated along its lower edge, the belly and legs pale ochreous. The ordinary spots and spiracles are black. The shining plate on the second segment is dusky between the lines.

The MOTH appears on the wing in July, and occurs in great abundance on the Devonshire coast. (The scientific name is *Leucania putrescens.*)



449. The Southern Wainscot (*Leucania straminea*).

449. THE SOUTHERN WAINSCOT.—The antennæ are very slightly ciliated in the male, perfectly simple in the female: the fore wings are pointed at the tip; their colour is a very delicate wainscot-brown with a slightly darker dash from the base along the middle of the wing; the wing-rays are rather paler than the interstices; in the very centre of the wing is a black dot, and half way between this and the hind margin is an oblique transverse series of black dots, some of them very inconspicuous, but two are distinct, and these form a triangle with the central dot; there is also a series of seven or eight small circular black dots on the very margin; the hind wings are white, but have an obscure transverse median series of small black dots, and a marginal series of still smaller ones; some of the interstices between the wing-rays are indistinctly clouded with smoky brown; the head and thorax are delicate wainscot-brown; the body white.

Guenée says that although the perfect insect has been well described by Treitschke, it is not so with the CATERPILLAR, which varies greatly, if we may judge by the published descriptions. This great lepidopterist thus gives the result of his own observations: its body is very long, and the ventral surface rather flattened; the legs are very long; the head is lenticular and of a yellowish-red colour; there is a very slender medio-dorsal stripe placed between two series of black dots; there is a lateral stripe like the medio-dorsal, but less distinct; and a broad and clearly defined spiracular line on both sides, and having its margins rather lighter; in the area between the lateral and spiracular stripes there is a series of small slender lines alternately blackish and of the ground colour, or even lighter; the spiracles are above the spiracular stripe, whitish and encircled by black: the first spiracle situated in the neck of the caterpillar is unusually large: the head is very pale, with indistinct markings. It is found in February in damp meadows and on the banks of streams; and when at rest stretches itself out in a straight position and remains motionless.

The MOTH appears on the wing in June, and was formerly taken in great abundance among the reeds at Hammersmith; but this once favourite locality seems likely to be destroyed, and I know of no other. (The scientific name is *Leucania straminea.*)



450. The Smoky Wainscot (*Leucania impura*).

450. THE SMOKY WAINSCOT.—The antennæ are evidently stouter in the male than in the female: the fore wings are scarcely pointed at the tip; their colour is wainscot-brown, the wing-rays being paler; they have a central black dot, and between this and the hind

margin are two other black dots which combine with the first in forming a triangle: the hind wings are dark smoke-colour, almost black, the fringe white: the head and thorax are wainscot-brown; the body very much paler.

The CATERPILLAR has been minutely described and figured in Boisduval's *Collection des Chenilles*, and I have obtained no information respecting it from any other source; it rests in a straight position on the blades of grass on which it feeds; the head is small, much narrower than the second segment, and porrected; the body is cylindrical, except at the extremities, which are tapering; the colour of the head is reddish brown, with darker reticulations, and six darker lines; the body is pale reddish gray: there is a medio-dorsal stripe intersected by a white thread-like line, and this is bordered by a rather broad brownish stripe, which has two black dots in each segment, really four on each segment, two on each side of the medio-dorsal stripe, and each of these black dots emits a small bristle: on each side are two compound stripes paler than the ground colour, one above, the other below the spiracles; both these stripes are pale yellow-gray and rather broad, and both are intersected throughout by a median red portion which seems to have no clearly defined boundaries; the ventral is paler than the dorsal area, and slightly tinged with green, the spiracles are oval, reddish, and edged with black: the legs are reddish, the claspers are concolorous with the ventral area, but each has two black points and a little cloud on the outside: it undergoes pupation in the earth without spinning any cocoon, and changes to a smooth CHRYSALIS of a dull deep red brown, which has a number of hooks at the anal extremity, two of which are longer and every way larger than the rest: they are widely separated at the base but approach at the tips.

The MOTH appears on the wing about midsummer, and continues throughout July; it is very abundant in England, Ireland, and Scotland. (The scientific name is *Leucania impura.*)

Obs.—A series of Scotch specimens, most kindly presented to me by Mr. Birchall, are rather smaller, and have the hind wings much blacker than English ones.



451. The Common Wainscot (*Leucania pallens*).

451. THE COMMON WAINSCOT.—The antennæ are very slightly thicker in the male: the fore wings are obtuse, almost rounded, at the tip: their colour is pale wainscot-brown, very frequently inclining to red, the tint being very delicate and beautiful; the wing-rays are very pale, nearly white; there is a black dot in the very centre of the wing, and two others between this and the hind margin, the three forming a triangle: the hind wings are white, the wing-rays and a portion of the interspaces slightly clouded; there are a few dots on the wing-rays, in some specimens forming a median series; the fringe is pure white; the head and thorax are wainscot-brown; the body paler.

The CATERPILLAR has been reared from the EGG which hatched in September; it feeds on grass and lives through the winter; it is full-fed about the middle of March or during April, and is thus described by Mr. Buckler in the third volume of the "Entomologists' Monthly Magazine:" its form is cylindrical, its colour ochreous or grayish ochreous, with a whitish dorsal line outlined with dark gray running through the middle of an oval mark of brownish-gray on each segment; the subdorsal line is whitish-margined above, with a grayish stripe, and below by a thin brownish line, and after an interval of the ground colour, another fine line of brown, edged below with a thin line of pale ochreous, followed by a broad stripe of grayish, the black spiracles being along its lower edge; below is a broad stripe of pale ochreous; the

belly and legs are ochreous-gray; the ordinary dots along the back are dark brown, and very small: the head is mottled with gray-brown.

The MOTH appears on the wing in June, July, and August, and is generally distributed throughout England, Ireland, and Scotland. (The scientific name is *Leucania pallens*.)



452. The Flame Wainscot (*Meliana flammea*).

452. THE FLAME WAINSCOT.—"The antennæ are alike in both sexes, inserted close to the eyes on each side of the crown of the head, not very long, setaceous, covered with scales above, pubescent beneath, the basal joint very robust. * * * Labial palpi curved upward, thickly clothed with scales, triarticulate, basal joint robust, second scarcely so thick, cylindrical, truncated obliquely; third, the longest, spoon-shaped, hollow, coriaceous at one edge, submembranous and ciliated at the other, and terminated by a bifid claw or tooth. * * * Wings convoluted when at rest, fore wings rather long and narrow, hind wings ample. * * * Fuscous with a pale reddish tinge, fore wings with a brown flame-like space along the centre (narrowed at the base), above which is a short narrow ochraceous stripe, five or six minute brown spots, forming a curved line near the hind margin, upon which there are seven minute black spots, alternating with the wing-rays, which are pale, inclining to white towards the costa, the internal margin sprinkled with dark spots; inferior wings rather paler, their fringe whitish."—*Curtis's British Entomology, Fars.* 201.

The MOTH appears on the wing in June, and has only been taken at Wicken Fen, in Cambridgeshire, and Yaxley in Huntingdonshire. (The scientific name is *Meliana flammea*.)

Obs.—The upper figure is copied from Mr. Curtis's "British Entomology," the lower figure from a specimen kindly lent me by Mr. Bond.



453. The Silky Wainscot (*Senta maritima*).

453. THE SILKY WAINSCOT.—The antennæ are very slightly pubescent, the fore wings are rather arched in the costa, rather pointed at the tip, and quite straight on the hind margin for half its length, when the outline suddenly bends obliquely to the anal angle; their ground colour is pale wainscot-brown, silky and glistening; the discoidal spots appear to be always present; sometimes only to be traced by an extremely slight outline, sometimes

plainly visible as black spots: but the ornamentation of the wings is so diverse and so varied, that no description could be compiled which should include them all, and therefore four of the most striking variations are selected as illustrations: the hind wings are pearly white; the head and thorax are pale wainscot-brown; the body silky white.

"The CATERPILLAR is yellowish ochreous with several fine lines (*Treitschke*). It feeds on the common reed (*Arundo Phragmites*), in September, March, and April."—*Stainton's Manual*, vol. i. p. 191.

The MOTH appears on the wing in June, and has been taken in the Cambridgeshire fens, and also in Hammersmith marshes. (The scientific name is *Senta maritima*.)

Obs. The moth represented in the third figure has been named *Bipunctata* by Haworth, and is the *Ilythia anella* of Stephens. This species is also the *Melia serica* of Curtis, and the *Senta Ulvæ* of Doubleday's List. I am indebted to Mr. Bond for the loan of the three varieties.



454. The Small Rufous (*Cœnobia rufa*).

454. THE SMALL RUFOUS.—The antennæ are very slender in both sexes: the fore wings have the costa rather arched, the tip very blunt, and the upper portion of the hind margin very straight; their colour is reddish-brown, with a median longitudinal dash, and the wing-rays darker; at some distance from the hind margin each ray has also a black dot, and these together form an oblique transverse series; the lowest ray, that nearest the inner margin, has two such dots; the hind wings are dark gray, tinged with brown; the basal portion of the fringe is ochreous, the exterior portion brown; the head and thorax are gray-brown; the body is paler, and very sparingly clothed with scales; it is tufted at the extremity.

The MOTH appears on the wing in July; it occurs very commonly in the Cambridgeshire fens, and has been taken at Epping and other places in the South. (The scientific name is *Cœnobia rufa*: it is the *Nonagria despecta* of Doubleday's List.)



455. The Reed Wainscot (*Nonagria Cannæ*).

455. THE REED WAINSCOT.—The antennæ are slightly ciliated in the male, and therefore appear stouter than in the female: the fore wings have the costa very slightly arched, the tip blunt but not rounded, the hind margin almost straight; their colour is red-brown, with the median ray dark brown, and terminating in a brown spot, beyond which is an arched series of dark brown spots, one on each wing-ray; the lowest wing-ray, that nearest the inner margin, has two such spots; the hind margin has sometimes, but not constantly, a dark continuous line; the fringe is red-brown: the hind wings are dingy brown, with reddish margins and fringe: the head and thorax are reddish brown, the body paler.

"The CATERPILLAR is greenish or yellowish, with the dots black, the head brownish, the plate of the second and anal segments greenish white; the spiracles black (*Treitschke*). It feeds on the reed mace (*Typha latifolia*)."—*Stainton's Manual*, vol. ii. p. 193.

The MOTH appears on the wing in August, and has been taken in the fens of Cambridgeshire. (The scientific name is *Nonagria Cannæ*.)

Obs.—The very peculiar red colour of this moth distinguishes it at once from either of its congeners, which are, generally speaking, very similar in colour, and difficult to distinguish.



456. The Bull-rush (*Nonagria Typhæ*).

456. THE BULL-RUSH.—The antennæ are ciliated in both sexes, rather more so in the male : the fore wings have the costa rather arched, the tip rather blunt, the hind margin slightly scalloped ; their usual colour is wainscot-brown, with three transverse series of small dark spots, the first of which consists of the usual six or seven spots forming a curved line, and these are always seated on the wing-rays ; the second of longitudinally linear or sometimes arrow-like marks, all seated in the interspaces and not on the wing-rays, and the third in a hind-marginal series of crescents on the extreme edge of the wing ; the hind wings are pearly gray, and have a broad band, more or less conspicuous, of a smoky black colour, just within the margin : the ground colour of the fore wings sometimes varies to a dark umber-brown, and this is more especially the case in the male : the head and thorax are wainscot-brown, the body dingy brown.

The CATERPILLAR is long and maggot-like, the head very glabrous, and the second segment having a dorsal plate, which is also highly polished. The head is reddish : the body is putty-coloured, inclining to wainscot-brown, with the plate on the second segment reddish—indeed, of the same colour as the head ; on each side, above the spiracles, are two narrow ochre-coloured stripes, the spiracles themselves being black ; the ventral surface, legs, and claspers are pale putty-coloured, the legs tipped with brown. It feeds in the stem of the reed-mace (*Typha latifolia*), eating only the pith until nearly full-fed, when it prepares a circular hole for escape, eating away the coating of the reed mace, except a very slender skin, almost as thin as tissue paper : having prepared this means of escape, it returns up the gallery it has excavated, and at the end of August changes to a dark brown CHRYSALIS, the anal extremity of which is fixed to the wall of its gallery, and there it hangs with the head downwards, about an inch and a half above the hole.

The MOTH appears on the wing in September, and occurs commonly in all localities in England where the reed mace (*Typha latifolia*) abounds. Mr. Birchall has not met with it in Ireland, but gives the County Wicklow as a locality, on the authority of Mr. Bristow. (The scientific name is *Nonagria Typhæ*.)



457. The Twin-spotted Wainscot (*Nonagria geminipuncta*).

457. THE TWIN-SPOTTED WAINSCOT.—The antennæ are nearly simple in both sexes ; the fore wings have the costa rather arched, the tip blunt, the hind margin nearly straight ; their colour is dingy olive-brown, paler and inclining to ochreous along the inner margin, more especially towards the base of the wing ; in the very centre of the wing is a small double spot, sometimes white, sometimes dark brown, and in some instances, white surrounded with dark brown ; and between this and the base is a second double spot, often indistinct, and apparently almost absent,

but when distinctly present, entirely brown without any white: the hind wings are plain brown with paler fringe: the head, thorax, and body are rather pale brown.

The CARERPILLAR, according to Guenée, is of a dingy white colour freckled with brown spots; the head is ferruginous and glabrous, and the spiracles are black: it resides in the interior of the hollow stems of the common reed (*Arundo Phragmites*), on which plant exclusively it seems to feed.

The MOTH appears on the wing in July, and has been taken near Witham, in Essex, and in Hammersmith marshes. (The scientific name is *Nonagria geminipuncta*.)



458. The Brown-veined Wainscot (*Nonagria Arundineti*).

458. THE BROWN-VEINED WAINSCOT.—The antennæ are nearly simple in both sexes; the fore wings have the costa rather arched, the tip very blunt, and the hind margin slightly arched; their colour is ochreous-brown in some specimens, plain brown in others; in the former instances there is a darker median longitudinal dash, and near the extremity of this is an ocellated nearly circular spot, dark brown in the centre, and surrounded with paler brown: in the paler specimens the wing-rays are spotted; there are three rather conspicuous but very small spots above the ocellated spot, but nearer the base of the wing, and there is also a hind-marginal series of dark crescentic spots: the hind wings are gray-brown and rather paler at the base; they also have a marginal series of dark crescentic spots: the head and thorax in the paler specimens is ochreous-brown; in the darker specimens, dark brown; the body is long, slender, and tufted at its tip; its colour is grayish-brown.

"The CATERPILLAR is dirty white with pale red dorsal line (*Treitschke*). It feeds in the stem of the common reed (*Arundo Phragmites*)."—*Stainton's Manual*, vol. i. p. 193.

The MOTH appears on the wing in July, and has been taken in the fens of Cambridgeshire. (The scientific name is *Nonagria Arundineti*: it is the *Nonagria neurica* of Doubleday's List).

Obs.—The lower figure represents the variety *dissoluta* of Treitschke: this is the *neurica* of Hübner, figs. 659—661, and the *Hessii* of Boisduval. The upper figure is the *neurica* of Treitschke.



459. Fenn's Nonagria (*Nonagria brevilinea*).

459. FENN'S NONAGRIA.—"Fore wings rather sharply angulated at the junction of the costal and hind apical margins; brownish ochreous, with numerous scattered black scales; a sharply-defined short black dash from the middle of the base; a curved row of small black dots reaches from the costa to the inner margin beyond the middle; apical veins [rays] conspicuously paler than the ground-colour, apical margin unspotted; hind wings gray, paler towards the base, a very indistinct transverse row of black dots, rather beyond the middle, uniform with those in the fore wings."—*C. Fenn, in Entomologists' Monthly Magazine*, vol. i. p. 107.

The MOTH appears early in August: Mr. Fenn, to whom we are indebted for a knowledge of the insect, and whose description I have quoted, took a single specimen flying at dusk among the great reed mace (*Typha latifolia*), on the 4th of August, 1864: he has most kindly lent me the insect to figure for

this work. (The scientific name is *Nonagria brevilinea.*)

Obs.—I can do nothing more than quote the description, without expressing any opinion as to the validity of the species.



460. The Large Wainscot (*Calamia lutosa*).

460. THE LARGE WAINSCOT.—The antennæ are slightly ciliated in the male, which gives them the appearance of being much stouter than those of the female, but in both sexes they are rather stouter than in the congeneric species: the fore wings have the costa slightly arched beyond the middle, the tip rather pointed, and the outline of the hind margin waved; their usual colour is very pale wainscot-brown, the wing-rays being still paler, and the interspaces in the immediate vicinity of the rays being sprinkled with black s[illegible]s; beyond the middle of the wing is a curved series of six or seven black spots, all of them seated on wing-rays; the ground colour often varies to reddish-ochreous, and sometimes to sienna-brown; the hind wings are pearly white, sprinkled with dark brown or black scales, and frequently, but not constantly, having a median transverse series of dark spots, all of them seated on wing-rays: the head and thorax are usually very pale wainscot-brown, but vary with the colour of the fore wings; the body is pearly white, slightly tinged with wainscot-brown.

The EGG is laid in August, September, and even occasionally so late as October, on the stems of the common reed (*Arundo Phragmites*), and the young CATERPILLAR very shortly emerges, and eats into the stem, descending towards the roots, on which it feeds, below the surface of the ground: it feeds during the remainder of the autumn, and probably also throughout the winter and spring, ceasing and remaining in a quiescent state only during severe frost: when full-fed, it gnaws its way upwards, and just above the surface of the earth it erodes the reed-stem, in a circular form, sufficiently large to admit of the escape of the moth, but invariably leaving a thin epidermal layer of cuticle, just sufficient to prevent the influx of water in flood-time, but offering very slight resistance to the moth, when, having accomplished its final change in August, it is prepared to enter on its new career. The caterpillar is full-fed about midsummer: the head is then exserted and porrected in crawling, and is nearly equal in width to the second segment; it is semi-globose, prominent, and glabrous; the body is very long, maggot-like, flabby, and gradually attenuated towards the anal extremity; there is a corneous, glabrous, dorsal plate on the second segment; the dorsal surface is transversely wrinkled when at rest, and has a lateral skinfold; small bristles are scattered over the body, more especially on the thirteenth segment. The colour of the head is clear chestnut-brown, with black labrum and mandibles: the body is pale flesh-colour; the ventral paler than the dorsal surface; the legs and claspers of the same pale hue as the ventral surface. It changes to a smooth brown CHRYSALIS in the interior of the reed.

The MOTH appears on the wing in August, and has been taken in many of our English counties: it has the same predilection for the common reed (*Arundo Phragmites*) as *Nonagria Typhæ* has for the reed-mace. (The scientific name is *Calamia lutosa.*)



461. The Fen Wainscot (*Calamia Phragmitidis*).

461. THE FEN WAINSCOT.—The antennæ are scarcely different in the two sexes: the fore wings are rather produced at the tip, but

not pointed; they are extremely glossy, and of a very ambiguous colour, pale ochreous at the base, gradually deepening to an olive-brown towards the hind margin; the fringe is darker than any other part of the wing; the hind wings are gray-brown, with the rays and fringe paler; the head and thorax are pale ochreous-gray, the body rather darker.

The EGGS are laid in July, on the stems of the common reed (*Arundo Phragmites*), and the little CATERPILLARS soon emerge, enter the stem through a minute circular aperture, which they gnaw, and begin feeding: towards the end of the following May they may be found in the stem, in the first or second internode from the top. When full-grown, the caterpillar has a very maggot-like appearance; if removed from the interior of the reed, it does not feign death, or roll itself in a ring, but is restless, and crawls incessantly, but not with great activity: the head is very small, and extremely glabrous; it is porrected in crawling: the body is obese, and slightly attenuated towards both extremities; on the dorsal surface of the second segment is a semicircular corneous plate, the convex margin of which is behind; the dorsal surface of the thirteenth segment is entirely covered by a similar plate; the incisions of the segments are clearly marked. The head is intensely black; the body dingy white, with a large amorphous ill-defined purplish patch on each side of each segment, except the second and thirteenth; the corneous plate on the second segment is glabrous and brown; below it on each side are three black dots; on the third and fourth segments, respectively, is a transverse dorsal series of ten black dots; on each of the following segments are four such dorsal dots; the anterior pair on each segment, excepting the eleventh, are rather nearer together than the posterior pair; on the twelfth segment they form an exact quadrangle; on the sides are two series of similar dots; every one of these dots emits a black bristle; the ventral surface of the fifth and sixth segments is purplish, of the others, dingy white; the legs are rather long, glabrous, corneous, and dark brown; the claspers are dingy semi-transparent white; they are slightly constricted at the base, a peculiarity which gives them an elongate-linear and unusual appearance. About the middle, or towards the end of June, the caterpillar gnaws a perfectly circular hole in the stem of the reed, and, descending to the ground, changes to a CHRYSALIS amongst damp moss.

The MOTH appears on the wing about mid summer, and is very local: I have taken it on the banks of the Thames below and opposite Greenwich, once a delightfully wild and productive region for the naturalist; subsequently it became a perfect hive of industry in our shipbuilding days: now, owing to the effects of trades' unions and strikes among the shipwrights, this trade has gone abroad or to the North, and the wretched inhabitants are pauperised, and subsisting on parish relief or private bounty, so that we may look forward to the return of the whole district to its pristine state, and that the naturalist will again revel in undisturbed security and silence, where the clang of hammers, and the smell of pitch, and the busy tread and loud voices of innumerable money-making artizans once reigned supreme. It has also been taken in some abundance in the Cambridgeshire fens. (The scientific name is *Leucania Phragmitidis*.)



462. The Brighton Wainscot (*Synia musculosa*).

462. THE BRIGHTON WAINSCOT. — The antennæ are slightly pubescent in the male, quite simple in the female; the wings are very straight on the costa, blunt, but not rounded at the tip, and have the hind margin very oblique; their colour is whitish, almost white, with a tinge of ochreous, and there are three very faint and indistinct stripes originating at the base and diverging: the hind wings are almost white, and their

rays darker : the head, thorax, and body are pale ochreous.

My specimen was taken in August at Brighton, and Mr. Douglas Wilkinson informs me it has been taken in Kircudbrightshire, in Scotland, but I have not seen any specimens from the North : is the specimen correctly named ? (The scientific name is *Synia musculosa.*)



463. The Small Wainscot (*Tapinostola fulva*).

463. The Small Wainscot.—The antennæ of the male are slightly pubescent, and therefore appear stouter than those of the female : the fore wings have the costa quite straight to the tip, which is rather pointed ; their hind margin is straight at the tip, but rather convex below ; their colour is very various, sometimes whitish-gray, sometimes ochreous or fulvous, and sometimes even ferruginous or brick-dust red, but always sprinkled, more or less, with black or dark-brown atoms or single scales, and these are so numerous on the wing-rays and in the vicinity of the subcostal and median wing-rays, and again near the tip, as to give these parts a decidedly darker tint ; each of the parallel rays has also a small black dot, and these together form a curved series almost parallel with the hind margin ; the fringe is nearly concolorous with the disk of the wing : on the underside of the moth the central area of the fore wing is smoky-gray, and all the margins are paler : the hind wings are small, rather narrow and rather long, in this respect contrasting with those of Hellmanni ; their colour is smoky-gray, the fringe and costal margin being paler : the head and thorax vary in colour with the fore wings, the thorax being densely clothed with longish scales ; the body is whitish-gray, the extremity in the male being tufted, or rather fringed, with long scales.

"The CATERPILLAR is short and thick, dirty-white with reddish dorsal stripe ; a blackish line above the spiracles (*Treitschke*). Feeds in the stems of grass (*Poa aquatica*), and sedge (*Carex*)."—*Stainton's Manual*, vol. i. p. 193.

The MOTH appears on the wing in September, and is found in most of our English counties, north and south. Mr. Birchall informs us that it is widely distributed in Ireland, and Mr. Logan takes it in Scotland. (The scientific name is *Tapinostola fulva :* it is the *Nonagria fulva* of Doubleday's List.)



464. The Concolorous (*Tapinostola concolor*).

464. The Concolorous.—The palpi are long and projecting ; the antennæ are simple in both sexes : the fore wings are nearly straight on the costa and blunt at the tip ; their hind margin is straight for half its length, and then rather suddenly bends towards the anal angle ; their colour is dingy-white, slightly tinged with wainscot-brown, the wing-rays appearing paler from the interspaces being sprinkled with darker atoms or scales, especially towards the hind margin : there is an arched series of seven or eight black dots beyond the middle of the wing, and somewhat following the course of the hind margin : the usual discoidal spots are

not perceptible : the hind wings are rather darker than the fore wings, especially towards the hind margin, and there is a small, faint and scarcely perceptible discoidal spot : the head and thorax are of the same colour as the fore wings ; the body is paler.

The MOTH appears on the wing in June, and has been taken in the fens of Cambridgeshire. (The scientific name is *Tapinostola concolor*.)

Obs. Guenée believes this species to be *Leucania extrema* of Herrich-Schæffer, described at great length in his "Systematische" (*Nocturni*, p. 228, and figured 337) ; but neither the description nor figure exactly agrees with our English insect : the transverse series of minute spots is not represented in Herrich-Schæffer's figure, which, moreover, has a marginal series of black dots wanting in ours.



465. The Mere Wainscot (*Tapinostola Hellmanni*).

465. THE MERE WAINSCOT.—The palpi are rather long and projecting ; the antennæ are simple in both sexes ; the fore wings are straight on the costa, pointed at the tip, and have the hind margin straight for about two-thirds of its length, and then bent rather abruptly towards the anal angle ; their colour is reddish-fulvous, all the wing-rays being darker and speckled throughout ; both the discoidal spots are plainly perceptible ; they are outlined in pale ochreous, almost in white, the enclosed space being nearly of the same colour as the disk of the wing : the hind wings are very ample, and their hind margin is semicircular ; their colour is paler than that of the fore wings, but still faintly clouded with brown towards the hind margin : the head, thorax, and body are of the same colour as the wings ; the female is usually smaller and paler than the male.

The MOTH appears on the wing in June, and has been taken in the fens of Cambridgeshire. (The scientific name is *Nonagria Hellmanni*.)



466. The Lyme Grass (*Tapinostola Elymi*).

466. THE LYME GRASS.—The palpi are almost concealed by the long scales in which they are clothed : the antennæ are slightly stouter in the male than in the female : the fore wings are straight on the costa, very blunt at the tip, and arched on the hind margin ; their colour is pale wainscot-brown with darker shades, more especially in the male ; the darker colour forms two spreading streaks, both extending towards the hind margin : there is a double series of very inconspicuous spots on the wing-rays taking the same curve as the hind margin ; in the male there is an indication of the reniform and orbicular spots paler than the general area, and in the female there is a brown spot in the place of the reniform ; in both sexes the fringe is alternately darker and lighter, but the contrast is not great ; the hind wings are very pale and rather silky : the head and thorax are precisely of the same colour as the fore wings, the body of the hind wings.

The MOTH, according to Guenée, has been taken in Prussia on the shores of the Baltic, but is very rare : one or two specimens have been taken in England. (The scientific name is *Tapinostola Elymi*.)

Obs. I am indebted to Mr. Doubleday for the loan of the continental specimen I have figured : I have not an English one.



467. Bond's Wainscot (*Chortodes Bondii*).

467. BOND'S WAINSCOT.—The antennæ are very nearly simple in both sexes; the fore wings are almost straight on the costa and almost pointed at the tip, their colour is white slightly clouded with gray, and having a curved transverse series of six or seven black dots parallel with the hind margin; on the under side of the moth the entire area of the fore wings, with the exception of the margins, is smoky-brown: the hind wings are smoky-brown with white fringe: the head and thorax are white, the body pale gray.

The MOTH appears in June and July, and has been taken in Woolwich marshes, and also near Folkestone. (The scientific name is *Chortodes Bondii.*)

Obs. It need not be concealed that considerable uncertainty attends the name of *Bondii*, most entomologists believing the species to be identical with the *Noctua extrema* of Hübner; but on this I am unable to pronounce with certainty, and therefore prefer to retain the name of "*Bondii*," a just compliment to a most zealous entomologist, and a kind friend to all who know him. I would not, however, on these grounds transgress the law of priority were I by any means certain that the two names under consideration referred to the same insect.



468. The Small Dotted-Buff (*Chortodes arcuosa*).

468. THE SMALL DOTTED-BUFF.—The palpi are porrected, moderately long and rather distant; the antennæ are simple in both sexes: the fore wings are ample, especially in the male, their costal margin is very slightly arched, and their tip blunt; their colour is ochreous, with several dark spots on the costa, and two series of longitudinally linear black spots on the disk, and between these two series is a broad transverse band slightly darker than the general area, and more particularly observable in the female, especially towards the inner margin; there is a hind-marginal series of transversely linear spots, and a longitudinally linear mark is attached to each of them, but soon disappears towards the disk of the wing: the fringe is also varied: the hind wings are smoky-brown with a paler fringe: the head and thorax are dingy-ochreous, the body smoky-brown.

The CATERPILLAR is said to feed on the turfy hair-grass (*Aira cæspitosa*), and to conceal itself in the interior of the enormous tussocks formed by that beautiful grass, but I have never succeeded in finding it.

The MOTH appears on the wing in June and July, frequenting those grassy places in woods where the *Aira* abounds in most of our English counties. (The scientific name is *Chortodes arcuosa.*)

Obs. 1. My illustrious predecessor described the sexes of this insect as distinct species, and placed them in different genera without taking any notice of their similarity; the male is his *Phytometra arcuosa* (*Lepidoptera Britannica*, p. 260, No. 17), and the female his *Noctua minima* (*Id.* p. 216, No. 153). In Doubleday's List, these are united under the name of *Miana arcuosa.*

Obs. 2. In concluding the family of *Leucanidæ*, it seems desirable to allude to the changes which it has been deemed right to make in the names: but I believe I may state, that where I have departed from the names and arrangement of Mr. Doubleday's List, it has been with the entire approval of that lepidopterist.



469. The Brindled Ochre (*Dasypolia Templi*).



The under-side of the Brindled Ochre.

469. The Brindled Ochre.—The palpi are rather slender and compressed, forming a kind of beak; the divisions of the joints are not perceptible on account of the mass of scales in which they are clothed; the trunk is very short, and the moth has rarely been observed using it for procuring the honey of flowers or attracted by the sugar-bait prepared by entomologists: the antennæ of the male are doubly fringed, each joint emitting on each side a fascicle of slender hairs, six or eight in the fascicle, and these are of different lengths; the hairs in each fascicle are approximate at the base, but diverge towards the extremity: the antennæ of the female are downy or velvety, but the down is so short that they appear simple when viewed with the naked eye: the head and thorax are thickly clothed, especially in the males: the wings are ample, and their fringe remarkably long; the fore wings have a straight costa and a rounded tip; their colour is ochreous-gray, the ochreous tint generally much more apparent in the males than in the females; both the discoidal spots are paler than the ground colour, but very indistinct and sometimes scarcely perceptible, and there are two transverse zigzag lines darker than the ground colour, but also, like the discoidal spots, very indistinct and imperfectly defined; the first of them is nearer the base than the discoidal spots, and is nearly direct; the second is exterior to the discoidal spots, curved after leaving the costa, and very oblique; the hind-marginal area has a darker tint than the rest of the wing, but is interrupted by a pale transverse zigzag line, very undefined: the hind wings are paler than the fore wings, and have two indistinct narrow bars rather darker than the ground colour, the margin is also darker; the head, thorax, and body are dingy gray-brown, inclining to ochreous in the male: the fore and middle thighs are densely clothed with thick woolly scales as shown in the third figure, in which it will also be seen that the ornamentation of the under side is different from that of the upper.

The hybernated females, impregnated in the autumn, lay their eggs in March on the cow parsnip (*Heracleum sphondylium*), in confinement. Mr. Doubleday found that this event took place about the 20th of March, and that the eggs were fixed on the underside of the leaves, but whether this is so in a state of nature I am unable to say: the egg is shaped somewhat like an Echinus, but is rather taller, and its sides are ribbed; when first laid "it is yellowish in colour, with a pinkish-brown spot on the top, and a ring rather above the middle; finally turns black a day or two before the hatching of the caterpillar." The caterpillars "appear about the 20th of April; at first, they are of a dingy olive-colour, with black heads, rather longish-looking in shape." "Some began by attacking the leaf itself, and afterwards the stem; others made at once for the stem, and commenced eating their way into the interior and

drinking the sap which flowed in their little tunnels." As the caterpillars grow older and larger, they burrow downwards head foremost, and make their way slowly but regularly in the same direction, until eventually they enter the root, in the very centre of which they excavate a circular gallery at least half an inch in diameter : the presence of a caterpillar in the root is made apparent by the drooping or sickly appearance of the plant on which its destructive powers are being exercised. Removed from its retreat, an operation which requires care, since the slightest fracture of the skin is fatal, it neither feigns death nor rolls in a ring, but crawls slowly and deliberately into some dark recess, and embraces the first opportunity of concealing itself in the stem or root of the food-plant. I need, perhaps, scarcely say that the plant must be pulled up and the stem carefully split open until the interior of the root is exposed. The head is very glabrous and is porrected in crawling, but when the caterpillar is perfectly quiescent, it is nearly withdrawn into the second segment: the body is uniformly cylindrical, and has a conspicuous corneous plate on the back of the second, and another on the back of the thirteenth segment: on the twelfth segment are three minor corneous plates arranged transversely : the colour of the head and corneous plates is testaceous brown ; the body is dingy flesh-coloured, and rather shining, and has a number of dark brown dots on every segment ; these dots form a transverse series on the backs of the third and fourth segments ; they are four in number on the back of the following segments, from the fifth to the eleventh, both inclusive ; the twelfth has but two dorsal dots in addition to the three corneous plates already mentioned ; on each side of each segment are four such dots, and within the area bounded by these four dots is a white spiracle margined with black, and there is one other such dot on each side of each segment at the base of each leg and clasper ; every dot emits a minute hair ; on the fifth, sixth, eleventh, and twelfth segments are numerous smaller dots of the same colour, and these are arranged in a transverse series: the legs and claspers are concolorous with the body.

The CATERPILLAR is full-fed about the middle of August, when it makes an aperture in the side of the root, and leaves its domicile for ever ; it now wanders a considerable distance from its food-plant, sometimes on the surface of the ground, but I think generally beneath the surface : this certainly was the case with those I had in confinement, which were provided with loose light earth, in which they could have burrowed without difficulty ; and having placed a satisfactory space between its present resting-place and its quondam home, it makes a rude cell in the earth, and without the slightest apology for a cocoon, changes to a smooth dark brown CHRYSALIS, the terminal or anal segment of which is rather long and slender, and is furnished with two long and sharp spines.

Both sexes of the MOTH leave the chrysalis state in October, and the female is impregnated, after which, it may be presumed, the male dies, for he certainly disappears ; but the females hybernate, passing the winter under stones, and may be found motionless and semi-dormant during the coldest weather : the entomologist has often found it a finger-aching and laborious task to remove the heaps of stones, one by one, in the hope of finding an occasional prize, and it may not be quite out of place to remark that the dense furry clothing of the moth seems especially adapted for its protection and comfort under such adverse conditions. It has been found both in the north and south of England, Yorkshire, Lancashire, Devonshire, and the Isle of Wight. The Rev. Job Johnson says he took the female at the blossoms of the sallow. Mr. Birchall informs us it is common at Howth, in Ireland. (The scientific name is *Dasypolia Templi.*)

Obs. 1.—The genus *Dasypolia*, instituted for the reception of this single species by M. Guenée, who was unacquainted with its economy, is placed by that eminent lepidopterist between *Polia* and *Epunda ;* but having been most obligingly furnished, by a friend, with all the materials for a life-history of the species, and its interesting economy having

been carried on under my own eyes, I published, some years back, in the *Zoologist*, the details I have now reprinted, which appear to me to open up other unlooked-for affinities: thus there are not only striking points of similarity between *Dasypolia* and Guenée's families, *Leucanidæ* and *Apamidæ*, but others between *Dasypolia* and the xylophagous genus *Phragmatœcia*, and the rhizophagous *Hepialus*. Admitting the propriety of grouping the Noctuas into families as Guenée has done, I must regard *Dasypolia Templi* as a member of the family *Apamidæ*.

Obs. 2.—Mr. Buckler, having lately published some remarks on this species in the *Entomologists' Monthly Magazine*, while this description was going through the press, I have inserted his additions in inverted commas.

Obs. 3.—Seeing that the economy of this species is carried on entirely in the dark, totally concealed from the prying curiosity of birds and beasts, or even of man, it appears to me remarkable that a very large, indeed an overwhelming, majority of the individuals never attain maturity, owing to the attacks of ichneumonideous parasites. It is difficult to imagine in what manner, or at what period of the caterpillar's life, the parent ichneumon can possibly find access to it, and, led with such certainty by its own unerring instincts, prevent the creature from arriving at perfection, and thus arrest the multiplication of the species. A similar instance of an internal-feeding caterpillar becoming the prey of an ichneumon, occurs in the genus *Sirex;* but in that instance the parasite is of excessive rarity, the victim frequently most injuriously common. The parasites on *Dasypolia Templi* are of two kinds; first, a large solitary species of true ichneumon (*Ichneumon castanopyga*), and, secondly, a small gregarious species of *Microgaster*, the name of which has not been ascertained, but which is so numerous that Mr. Bond bred four hundred and forty-seven of them from a single chrysalis. Neither of these parasites is peculiar to this moth; the smaller one is known to destroy hundreds of the caterpillar of *Xylophasia polyodon*.



470. The Frosted Orange (*Gortyna flavago*).

470. The Frosted Orange.—The palpi are rather long and porrected, the terminal joint small, short, and comparatively naked; the antennæ appear rather stouter in the males than in the females, from their being slightly ciliated; they are of a dingy purple colour, except the broad basal joint, which is white: the fore wings are ample, nearly straight on the costa, pointed, but not acutely so, at the tip, and slightly waved on the hind margin; their colour is varied, bright ochreous-yellow and rich purple-brown, the limits of each colour being always clearly defined; the yellow occupies the base of the wing and a broad transverse median band; the purple occupies a transverse band near the base, and a very broad oblique hind-marginal band, but the ground or prevailing colour in each of these principal divisions of the wing is interrupted by well-defined markings of the other colour: thus the basal yellow blotch contains two irregular transverse purple lines; the adjoining purple band has a single but very conspicuous yellow spot; the broad median yellow band has the orbicular and reniform spot as well as a D-shaped spot situated below it, clearly outlined in purple, and also three waved but transverse purple lines; the first of these is continuous and placed nearest to the base of the wing; the second is slightly interrupted, and passes between the orbicular and reniform spots; the third is continuous and exterior to the reniform; the broad purple hind-marginal band is traversed by a yellow line broken up into several detached portions: the hind wings are dingy-ochreous, marked very indistinctly by a dusky discoidal spot, a transverse median line, and a submarginal band: the thorax is crested. it has a purple

disk, and is yellowish on the sides; the body is dusky; the anterior pair of thighs is densely clothed with long woolly scales.

The EGG is laid on the stems of burdock (*Arctium Lappa*), thistles (*Carduus*), elder (*Sambucus nigra*), hemp agrimony (*Eupatorium cannabinum*), fox-glove (*Digitalis europæa*), mullein (*Verbascum Thapsus*), and even the cultivated potato of our gardens; and the young caterpillar enters the stems through an excessively small opening, no trace of which can be discovered a few days after it has achieved the passage: the plant in which I have most commonly found this caterpillar is the marsh thistle (*Carduus palustris*), and this only by cutting open the stem about midsummer, when the full-grown caterpillar will be seen comfortably ensconced in the interior, and devouring the pith. When removed from its domicile, it neither feigns death nor rolls in a ring, but deliberately crawls away to some haven of refuge, which all the internal feeders seem to consider dependent on darkness. The head is narrower than the second segment, into which it can be partially withdrawn, but when the caterpillar is crawling, the head is porrected: it is rather flattened, glabrous, corneous, and of an ochreous-yellow colour: the body is nearly cylindrical, but rather attenuated at both extremities; it has a corneous plate on the back of the second segment, and another on the back of the thirteenth segment; both of these are hard and glabrous, the colour of these plates is dingy brown: the rest of the body is soft, maggot-like, and of a pale putty-colour tinged with yellow or pink, and it has a number of dark brown dorsal dots on each segment, each of which emits a minute bristle; these dots form a transverse series on the third and fourth segments, and a kind of square on those which follow; there are also other lateral dots, generally four on each side of each segment; the legs are horny and tipped with brown; the claspers soft, and of the same colour as the rest of the body. I have found these caterpillars full-fed during the first week in July in the stems of the tall marsh thistles, which often abound in Joynson's wood, at the back of the inn at Birch Wood Corner: scarcely one of these stately plants escapes, and its fate is plainly indicated by the sickly and moribund state of the remarkable clustered head of flowers with which this species is so conspicuously crowned. The annual gathering of entomologists at Birch Wood during the first week in July, when these observations have been so often repeated, seems to fix indelibly on the mind the period when the caterpillar has arrived at its full growth. When about to change, it prepares a means of escape by gnawing away the substance of the thistle-stem, leaving only the most slender and delicate epidermis which always remains intact; and then changes to an elongate, cylindrical, smooth, dark brown CHRYSALIS, which has a small nipple-like projection from the crown of the head, and two sharp spines placed transversely on the terminal or anal segment.

The MOTH appears on the wing in June, and is generally distributed throughout our English counties: it is common and widely distributed in Ireland and Scotland. (The scientific name is *Gortyna flavago*.)

Obs. This species is remarkably obnoxious to the attacks of an ichneumon; scarcely one in twenty seems to reach maturity; but the mode in which the ichneumon contrives to introduce its egg into the concealed caterpillar has not been ascertained.



471. The Ear-Moth (*Hydræcia nictitans*).

471. THE EAR-MOTH.—The palpi are slightly curved upwards, but not very prominent; the antennæ appear thicker in the

male, owing to their being slightly ciliated : the fore wings are nearly straight on the costa, pointed, but not acutely, at the tip, and waved, but not scalloped, on the hind margin ; their prevailing colour is rich ferruginous brown, varied with darker longitudinal streaks or stripes and transverse lines, which combine in giving a somewhat reticulated appearance to the wing. The orbicular is very round, and usually of a fulvous colour, but often indistinct ; the reniform is usually white, and very distinct, but sometimes bright fulvous ; it is divided at its lower extremity into two portions, and the upper portion contains an evident reniform mark, in outline corresponding with the exterior outline ; the hind wings are gray-brown with a paler fringe ; the head, palpi, antennæ, and neck are rich reddish brown ; the thorax darker brown, the body gray-brown, inclining to red towards the extremity.

"The CATERPILLAR is dull brown, the dorsal plate of the second segment darker and shining ; a row of brown dots on each side of the dorsal line (*Treitschke*), on roots of various grasses."—*Stainton's Manual*, vol. i. p. 197.

I have found this pretty little MOTH on the wing in the middle of the day in all English localities where I have collected ; it is very fond of settling on flowers. Mr. Birchall says it is common, and widely distributed in Ireland, and Mr. Douglas Robinson that it occurs in Kirkcudbrightshire, in Scotland. (The scientific name is *Hydrœcia nictitans.*)

Obs. 1.—The very common variety of this insect represented in the second figure, and having no trace of white in the reniform, is the *Noctua erythrostigma* of Haworth (*Lep. Brit.*, p. 240). My illustrious predecessor, although comparing it with the more usual variety with the white reniform, emphatically pronounces it "distinct" as a species, a decision in which I am unable to concur.

Obs. 2.—*Hydrœcia lucens* of Herrich-Schæffer must also be referred to this species : I entirely agree with M. Guenée, who says, "I confess that I am totally unable to point out any character by which to distinguish *Lucens* from *Nictitans.*"



472. The Butter-bur (*Hydrœcia Petasitis*).

472. THE BUTTER-BUR.—The palpi are curved upwards, but are very inconspicuous ; the antennæ are delicately ciliated in the male : the fore wings are slightly arched on the costa, rather pointed at the tip, very slightly incurved below the tip, and have the hind marginal outline waved but not scalloped ; their colour is gray-brown, suffused in recently disclosed specimens with a purplish gloss or reflections : there is a darker median band, in which the paler reniform and orbicular are very visible ; there is also a hind marginal band, the interior border of which is irregular, but mapped out by a slender gray line : the wing-rays are thickly sprinkled, but not entirely covered with pale gray scales : the hind wings are pale dingy gray-brown, with a crescentic discoidal spot, a median transverse line, and a hind marginal shade rather darker : the antennæ are pale ; the head and thorax of the same colour as the fore wings ; the body of the same colour as the hind wings.

"The CATERPILLAR is of a dull whitish colour with black dots ; the head and the dorsal plates of the second and anal segments reddish brown" (*Freyer*)—*Stainton's Manual*, vol. i. p. 198. It feeds in the roots and flowering stems of the butter-bur (*Petasites vulgaris*), and when full fed leaves its food-plant and forms a cocoon of earth glued together, and in this changes to a CHRYSALIS.

The MOTH appears on the wing in October. It is likely to be found wherever the butter-bur (*Petasites vulgaris*) occurs, but at present has only been captured in one English county, Lancashire ; in Scotland, near Edinburgh ; in Perthshire ; and at Howth, in Ireland. (The scientific name is *Hydrœcia Petasitis.*)

Obs.—This species is the *Hydrœcia vindelicia*

of Freyer, Herrich-Schæffer, and Guenée, the last of whom treats our English insect as a variety, and retains Mr. Doubleday's name to the variety only: as this name has the claim of priority, and as I am unable to distinguish between the type and the variety, I retain the earlier name for the species.



473. The Rosy Rustic (*Hydræcia micacea*).

473. THE ROSY RUSTIC.—The palpi are short and inconspicuous; the antennæ very slightly stouter in the males: the fore wings have the costa very straight, the top pointed, and the hind margin waved but scarcely scalloped; their colour is rich reddish brown, with a broad median band, the limits of which, as well as those of the orbicular and reniform spots, are clearly mapped out in outline; the outer portion of the median band is very rich dark brown; the space following the outer portion is much paler, but gradually deepens in tint to the hind margin, which is marked by a waved darker line; the hind wings are dingy gray-brown with a darker crescentic discoidal spot and transverse median bar; the antennæ are nearly white; the head and thorax of the same colour as the fore wings; the body of the same colour as the hind wings.

The head of the CATERPILLAR is rather narrower than the second segment; it is glabrous and porrected, and has a rather flat face: the body is soft, fleshy, and maggot-like, the segments being distinctly marked; each has sixteen or eighteen minute black warts, and each wart emits a minute but rather stiff bristle; there is a corneous glabrous plate on the second and thirteenth segments; the colour of the head is testaceous red, of the body grayish flesh-colour, with a very narrow darker medio-dorsal stripe; the dorsal has more colour than the ventral surface, which has a glaucous or bleached appearance; the warts on the third and fourth segments are arranged in transverse dorsal series, but not so on the fifth and following segments, including the twelfth; on these segments the dots usually form something like a triangle on each side of the medio-dorsal stripe, and three others form a linear series below them; the warts, as well as the bristles, are black; the legs and claspers are nearly concolorous with the ventral area. It feeds at the base of the leaves of sedges (*Carex*, *Cyperus*, *&c.*), but leaves this situation and buries itself in the earth in order to change to a CHRYSALIS.

The Rosy Rustic appears in the MOTH state throughout the autumn; there seems to be a succession of emergences, as in the case of so many internal feeders; it has been taken in most of our English counties. Mr. Birchall says it is common and widely distributed in Ireland; and Mr. Douglas Robinson gives it as a native of Kirkcudbrightshire, in Scotland. (The scientific name is *Hydræcia micacea*.)



474. The Flame (*Axylia putris*).

474. THE FLAME.—The palpi are short, rather inconspicuous, slightly curved upwards, and distinctly separate, the terminal joint is very short; the antennæ are simple in both sexes: the fore wings are narrow, straight on the costa, rounded at the tip, and having the hind margin very slightly waved; their colour is pale wainscot-brown, with a dark umber-brown costal margin, and two blotches of the same colour on the hind margin; the upper of these is somewhat wedge-shaped, the point of the wedge being directed towards the reniform spot; the lower, near the anal angle, is smaller and almost round; the reniform spot is indistinctly shaped like the letter S, the middle being a bent gray line, and surrounded by a black line, this again by a pale line, and last by a slender dark brown border; the orbicular is very inconspicuous, but has the

same colours; a double series of very distinct but very small black dots crosses the wing, halfway between the reniform and the hind margin; the fringe is spotted: the hind wings are very pale wainscot-brown and semi-transparent, with a very indistinct crescentic discoidal spot, and a series of dark marks on the hind margin, forming an almost continuous line: the head, neck, and body are pale wainscot-brown; the thorax is variegated with umber-brown. The species rests with its wings folded round the body, and much resembles a short piece of stick.

The CATERPILLAR is described by Guenée. It is of a brown colour like the bark of trees, and having the spiracular stripe dirty white, and the medio-dorsal stripe very slender, of a yellowish colour, and marked with a yellow dot, and two white dots on each segment; the fifth and sixth segments have also a dark green triangular spot; the head is of the same colour as the body; the spiracles are white, encircled with black; the twelfth segment is raised into a dorsal hump almost like that of *Mamestra Persicariæ*. It feeds in August on low plants.

The MOTH appears in June It is common in most of our English, Irish, and Scotch counties. (The scientific name is *Axylia putris*.)



475. The Clouded-bordered Brindle (*Xylophasia rurea*).

475. THE CLOUDED-BORDERED BRINDLE.—The palpi are rather long and porrected, the terminal joint long and slender; the antennæ are slightly ciliated in the male: the fore wings are slightly arched on the costa, more especially towards the tip, which is blunt, the hind margin is waved; their ground-colour is various, and necessitates the describing of three varieties.

The first variety is wainscot-brown, with a dark blotch of the costal margin passing between the discoidal spots and extending below them; there are two similarly coloured blotches on the hind margin, both of them pointing towards the middle of the wing, and a large whitish space on the inner margin; a double series of small and indistinct dark dots crosses the wing between the reniform and the hind margin; all these dots are seated on the wing-rays: on the extreme hind margin is a series of crescentic spots, each seated between the extremities of two wing-rays; the fringe is pale at the base, the pale bases of the scales forming a delicate line almost white; the exterior border of the fringe is spotted with two shades of brown; the hind wings are smoky brown, paler at the base, and having an indistinct crescentic discoidal spot: the head and collar are wainscot-brown, the thorax umber-brown, the body gray-brown and crested: the tips of the crests are dark smoky brown. This is, without doubt, the *Rurea* of Fabricius, but it is the *Hepatica* of Haworth; whence a confusion of names.

The second variety differs in having the fore wings of a uniform red-brown, the reniform spot being indicated by a pale line, and a few other darker and paler dots being scattered over the wing. This is Guenée's variety A: he describes it as the *Alopecurus* of Esper: it is represented in the second figure.

The third variety has the fore wings dark brown, with very little clouding or marbling, but having the discoidal spots mapped out in white. This appears to me to be Haworth's *Combusta*, but I believe that name is usually assigned to the preceding variety: my opinion is founded on Haworth's expressions *fusco-brunneus* and *stigmata ordinaria albide marginata*, neither of which terms is applicable to the second variety.

In all three varieties the reniform spot is of the usual form, the orbicular oblong and oblique.

The CATERPILLAR is obese, cylindrical, shining, and of a reddish colour, the second segment having a darker tint than the rest, and being adorned with three longitudinal streaks, which serve as the commencement of three stripes, one of which is medio-dorsal, dingy white, and bordered on each side with brown; the others are lateral and bordered on the upper side with brick-dust red: it feeds on the species of *Primula*, *Rumex*, and several grasses, and when full fed buries itself just below the surface of the earth, and there forms a very fragile earthen cocoon, in which it changes to a CHRYSALIS.

The MOTH appears on the wing in June, and is common in most of our English counties; it has also been taken in Scotland by Dr. Gordon, and it is said by Mr. Birchall to be common and widely distributed in Ireland. (The scientific name is *Xylophasia rurea.*)



476. The Light Arches (*Xylophasia lithoxylea*).

476. THE LIGHT ARCHES.—The palpi are curved and very slightly porrected, and the terminal joint is slender; the antennæ are slightly ciliated: the fore wings are narrow, nearly straight on the costa, blunt at the tip, and waved on the hind margin; their colour is very pale wainscot-brown or whitey-brown: they have on them three darker but very imperfectly defined blotches, the first near the middle of the costal margin, the second below the middle of the wing, and the third at the anal angle; I do not trace the discoidal spots, but there is a transverse series of dark dots beyond the middle of the wing, and each is seated on a wing-ray: the hind wings are very pale and thinly clothed with scales, so as to appear semi-transparent, but they have a rather darker though indistinct crescentic discoidal spot, and an equally indistinct bar parallel with the hind margin: the head, thorax, and body are of the same pale colour as the wings; the thorax and body are crested; the body has a large spreading tuft at the extremity.

The CATERPILLAR has been described in the *Entomologists' Weekly Intelligencer* by Mr. Robson, who says, "I have bred *Xylophasia lithoxylea* this summer from a caterpillar found at the roots of grass: it was of large size; the colour dirty white, with bluish tinge below; head and tail black, with two rows of black shining spots on each segment, one hair in each spot. I found it on the 8th of May: it seemed then nearly full fed. The perfect insect appeared on the 8th of July."

The MOTH appears on the wing in June, usually about midsummer: it is very common in England; has been taken in Scotland, and is common and widely distributed in Ireland. (The scientific name is *Xylophasia lithoxylea.*)



477. The Reddish Light Arches (*Xylophasia sublustris*).

477. THE REDDISH LIGHT ARCHES.—The palpi are short, curved, and scarcely porrected; the antennæ are slightly ciliated in the male: the fore wings are nearly straight on the costa, blunt at the tip, and waved on the hind margin; their colour is wainscot-brown, tinged with the reddish hue of raw sienna; there is a darker transverse median blotch, almost continued into a band, but ceasing before the inner margin; there are two other blotches of exactly the same tint on the hind margin, the first rather above the middle of the wing, the

second near the anal angle; the fringe is spotted; the hind wings are pale dull gray-brown, with a darker crescentic discoidal spot, and a darker transverse line between this spot and the hind margin; the fringe is pale; the head and thorax are of the same colour as the fore wings, the body rather paler and slightly crested.

The MOTH appears on the wing at Midsummer, and has been found in most of our English counties, as far north as Yorkshire. Mr. Birchall says it is very abundant near Galway, and that it has been taken near Dublin by Mr. Barrett. (The scientific name is *Xylophasia sublustris*.)

Obs.—My predecessor does not mention this common species as distinct from *Lithoxylea*, probably including the two species under that name: the words "*magis ferruginea*," as applied in reference to *Lithoxylea*, when compared with Hübner's figure of that insect, induces me to query whether he had not this species before him. Guenée expresses a doubt as to their distinctness, but appears satisfied to leave them as species, in which view I entirely concur.



478. The Dark Arches (*Xylophasia polyodon*).

478. THE DARK ARCHES.—The palpi are porrected, the terminal joint slender; the antennæ are slightly ciliated; the fore wings are nearly straight on the costa, blunt at the tip, and waved on the hind margin; their colour is a mixture of several shades of brown; the orbicular and reniform spots are very clearly defined by a double circumscription, the interior border being nearly white, the exterior dark umber-brown; the costal margin has a number of oblique dark spots, and three pale ones near the tip; there is a dark, almost black streak at the middle of the base, a dark brown space below the discoidal spots, bounded by a very dark, almost black, streak, and a dark brown hind marginal band, very irregular and bordered towards the middle of the wing by a pale transverse zigzag line, which forms a distinct letter W just below the middle; the inner marginal area is pale, becoming almost white beyond the middle: the hind wings are gray-brown, with a darker crescentic discoidal spot, and a darker broad marginal band; the margin is waved, the fringe pale: the head, thorax, and body are pale brown; the body crested on the back, and tufted at the extremity.

The CATERPILLAR is figured by Hübner as of a dull putty-colour, with the dorsal area of the second and twelfth segments considerably darker, and all the segments have shining black warts: it feeds exclusively on the roots of grasses and other herbage.

The MOTH appears on the wing in June and July, and is very common in England, Ireland, and Scotland. (The scientific name is *Xylophasia polyodon*.)

Obs.—Through the kindness of Mr. Birchall I have specimens of this common moth from Scotland that are really almost black, but I am not certain that this case of melanism is either constant in Scotland, or confined to that country. The black variety is represented by the lower figure.



479. The Clouded Brindle (*Xylophasia hepatica*).

479. THE CLOUDED BRINDLE.—The palpi

are curved and porrected, the terminal joint small and almost bare of scales; the antennæ are slightly ciliated in the male, simple in the female; the fore wings are slightly arched on the costa, especially towards the tip, which is blunt; the hind margin is waved; their colour is ochreous brown, with umber-brown markings; the chief of these is a suffused blotch between the discoidal spots, a more clearly defined blotch at the base of the inner margin, having its exterior border deeply notched, and a hind marginal band, having its interior border very irregular, and being intersected throughout by a curved and indented pale transverse line, exterior to which is a second pale line, regularly zigzag; the orbicular is long and oblique; the reniform of its usual shape; a double series of dark brown dots crosses the wing exterior to the reniform: the hind wings are dull dingy brown, with a paler and iridescent costal margin, and a dark crescentic discoidal spot; the head and thorax are variegated with the two shades of brown which prevail on the fore wings; the body is dorsally crested, of a dingy brown colour, with the tips of the crest darker brown.

The Rev. H. Harpur Crewe has thus described the CATERPILLAR, in the *Zoologist* for 1861:—"Back, dark brown: medio-dorsal stripe, whitish, bordered on either side of each segment by two black spots: sub-dorsal stripes slender, indistinct, whitish: the head and second segment are dark brown, the head rather the paler of the two, and traversed by two black lines: the sides are pinkish drab, marked on each side with a black spot: the ventral surface is pale drab; the back and sides are thinly clothed with slender hairs. This caterpillar hybernates in the autumn, when nearly full fed, and begins to feed again on grass, chickweed (*Stellaria media*), &c., in February, and is full fed at the end of March, or beginning of April: it then forms a neat cocoon of earth or moss, and therein changes to a dark red CHRYSALIS, the thorax and upper part of the body being darker than the rest.

The MOTH appears on the wing towards the end of June, and has been taken in most of our English counties. It has also been taken in Scotland by Mr. Lennon, and at Powerscourt, in Ireland, by Mr. Birchall. (The scientific name is *Xylophasia hepatica.*)



480. The Slender Clouded Brindle (*Xylophasia scolopacina*).

480. THE SLENDER CLOUDED BRINDLE.—The palpi are porrected and curved upwards, the terminal joint very pointed; the wings are slightly arched on the costa, and scarcely waved on the hind margin, the upper half of which is nearly straight, while the lower slopes rather abruptly to the anal angle; their colour is dingy ochreous, but the markings are generally very distinct. The reniform has a distinct white circumscription, the orbicular is indistinct; the space between them is dark bistre-brown, in many specimens prolonged in an indistinct manner to the inner margin, which has also a very dark, distinct, and somewhat linear blotch near its base; beyond the reniform is a sharply zigzag and elbowed transverse line, the extremity of its lobes or teeth being very dark, and often forming a transverse series of dots; the hind margin is occupied by an umber-brown shade, intersected throughout by a paler line, which terminates at the tip of the wing in an ochreous blotch; the fringe is spotted; the hind wings are pale dingy brown, with a still paler fringe; the head is ochreous brown; the thorax ochreous brown, with a posterior crest tipped with dark brown; the body is dingy brown, with a medio-dorsal series of dark brown crests.

Mr. Buckler has thus described the CATERPILLARS in the *Entomologists' Monthly Magazine* for 1864:—"They feed on coarse grasses, and a species of wood-rush (*Luzula*); their bodies are uniformly cylindrical and slender. The head, and plate on the second segment, are of a translucent greenish tint, and there is a black mark on each side of the

mouth. The ground-colour of the body is olive-green above; on the back there is a fine thread-like line of yellowish or pale grayish, enclosed by two others of dark gray, which form the dorsal line, and run through a series of elliptic marks of slate-colour. The sub-dorsal stripe is narrow and slate-colour, beginning at the third segment, and after the fifth merging into a broad lateral stripe (which commences on the second segment) of dark, slaty gray, most intense at its lower edge, just above which, on each segment, is a large blackish shining tubercle, furnished with a bristle; the ordinary dorsal tubercular spots are small, with minute hairs. The spiracular region is bright sulphur-yellow, and the belly greenish."

The MOTH appears on the wing in July, and has been taken in Buckinghamshire, Suffolk, Cambridgeshire, Lincolnshire, and Lancashire. Mr. Birchall says it has also been taken at Powerscourt, in Ireland. (The scientific name is *Xylophasia scolopacina.*)



481. The Bird's-wing (*Dipterygia Pinastri*).

481. THE BIRD'S-WING.—The palpi are rather long, curved, porrected, and naked at the tip; the antennæ are simple in both sexes; the fore wings are ample, nearly straight on the costa, blunt at the tip, and scalloped on the hind margin; their colour is dull black, with a dull ochreous mark on the inner margin, which expands at the anal angle into a large blotch, representing with remarkable fidelity the expanded wing of an eagle,—whence the name of "Bird's-wing;" there are two or three pale streaks between this bird's wing and the costa, and seven pale streaks in the black fringe. The hind wings are smoky black, with still darker rays, and a crescentic discoidal spot; the fringe is rather paler; the palpi and head are black; the antennæ dark brown, with a small pale button at the base in front; the thorax is crested, the front and sides being black; and the disk dark ochreous brown; the body is smoky brown, and very slightly crested.

The CATERPILLAR has a small head, narrower than the second segment; the body is cylindrical, smooth, rather attenuated at the anterior, and rather incrassated at the posterior extremity, the twelfth segment having a slight medio-dorsal elevation; the head is chocolate-brown, with four lines down the face; the body is of the same colour and has a darker medio-dorsal stripe, which is intersected throughout by a pale line; on each side is a lateral stripe less distinct; below this a spiracular stripe very distinct, broad, continuous, and of a dirty white colour; the dorsal dots are small and black, each of the posterior ones is attached to a small round white spot, particularly conspicuous on the fifth and sixth segments. It feeds in autumn on the different species of dock (*Rumex*), and when full fed spins a cocoon on the surface of the earth, and therein changes to a stout, cylindrical, blunt CHRYSALIS, the wing-cases of which are somewhat swollen.

The MOTH appears on the wing in June. It is abundant in Epping Forest, near Loughton, and also near Lewes, and in other parts of Essex and Sussex, and it has been taken in Surrey, Kent, and Suffolk. (The scientific name is *Dipterygia Pinastri.*)

Obs.—This is one of those moths which are constant in the arrangement and tint of their colours. I am unable to select from among the numerous specimens which have reached my hands, a single individual to which I can possibly allude as a variety. In this respect there is a great discrepancy among the Noctuas; some, as we shall have to observe in the genus *Agrotis*, being so variable that it is almost impossible to find two alike; others, as in the present instance, so similar, that it is equally difficult to find a variety.



482. The Silver Cloud (*Xylomiges conspicillaris*).

482. THE SILVER CLOUD.—The palpi are short, straight, and scarcely projecting, the terminal joint is short, blunt, and scaly; the antennæ are slightly ciliated in the male, simple in the female: the fore wings are rather narrow, the costal margin almost straight, the hind margin slightly scalloped; their colour is dark smoky gray, with a pale gray inner margin tinged with ochreous, and two bands obscurely indicated near the hind margin; the usual discoidal markings are not conspicuous in our English specimens.

Although this description will do very well for the more usual form of the species, it seems desirable to say that the distribution of colour in the fore wings is excessively various. Three marked varieties occur in the series of Continental specimens kindly lent me by Mr. Doubleday.

The first variety may be described as having the dark colour suffused over the whole costal and median areas; a pale oblique streak descends from the tip and ceases before reaching the middle of the wing; but is nearly joined by a second oblique streak proceeding from a large pale blotch near the anal angle. (See the upper figure.)

The second variety has the dark colour much more limited; it occupies the middle of the wing, and, leaving a large oblong space at the tip, ascends to the costa between the discoidal spots. (See the middle figure.)

The third variety is almost without the dark colour, being of a confused and somewhat ash-coloured tint, variously clouded with different shades of brown. (See the lower figure.)

In all three varieties there is a radiated appearance more or less conspicuous in the fore wings, arising from the blackness of the wing-rays: the fringe seems always to be dark, and there is a small linear tuft of pale scales at the extremity of each wing-ray: the hind wings are white or whitish, with a pale brown discoidal spot, margin, and wing-rays; the fringe is white; the head and thorax are gray, the latter decorated with a dark discoidal blotch, and darker borders, especially on the sides; the body is obese, crested at the base, and squarely truncate at the extremity; its colour is grayish brown.

The CATERPILLAR is described by Guenée as being of a brown colour, tinged with brick-red, and marbled with brown and white; the spiracular stripe is broad and continuous, paler than the ground-colour, and bordered above by a dark stripe; the subdorsal stripe is indicated by a dorsal series of darker lozenges, the "trapezoidals" are white, each with a black dot, the head is concolorous with the body, and has two dark streaks on the face. It feeds in July on bird's-foot trefoil (*Lotus corniculatus*) and other plants.

When full fed it buries itself below the surface of the earth, and changes to an obese blunt CHRYSALIS.

The MOTH appears on the wing in May, and is exceedingly rare in Great Britain. A few specimens have been taken in Kent, Surrey, and Worcestershire. (The scientific name is *Xylomiges conspicillaris*.)



483. The Feathered Brindle (*Aporophyla australis*).

483. The Feathered Brindle.—The palpi are short but porrected, scarcely curved; the antennæ of the male are stout and pectinated, the pectinations being very short, those of the female are simple: the fore wings are rather narrow, nearly straight on the costa, blunt at the tip, and somewhat scalloped on the hind margin; their colour is pale gray, with a cloud of brown-gray about the middle of the costa and extending round the reniform spot, which it includes; the reniform is of the usual form and clearly defined; the orbicular is oblique and oblong; at the base of the wing, about its middle, is a black streak, extending about a fifth of the length of the wing; on the inner margin near its base is a small but conspicuous linear blotch; on the costa beyond the middle are four small white spots; beyond the middle of the wing there is a zigzag and sharply angled black line, and between these and the base of the wing there are several other black lines angled and variously inclined; the hind-marginal area has the wing-rays black, and being on a pale gray ground they are very conspicuous; the black ceases before the transverse zigzag line; in each interspace between the black wing-rays is an elongate club-shaped black spot, which emanates from a small but very distinct black crescent, situated on the margin; the fringe is long, its outline waved, its colour gray-brown, interrupted by a few long white scales issuing from the end of each wing-ray: the hind wings are white in the male, with gray-brown wing-rays, and a marginal series of linear marks of the same colour, and frequently with a slight hind-marginal cloud in the female: in the female they are dull brown, with a pale fringe; the hind margin of the hind wings is indistinctly scalloped: the head is gray-brown with a black transverse line behind the collar; on each side of the thorax is a white patch, and at the middle of the posterior border is a black spot: the body is gray-brown, the basal segment having some longer scales, more especially observable in the male; the sides are fringed with similar scales.

Guenée describes the CATERPILLAR as cylindrical and smooth, and as having the dorsal area yellowish-red with a paler medio-dorsal stripe; the spiracular line is shaded with brown dots, and bordered on its upper side with black streaks: there is a short black mark originating in the "anterior incision," and resting on an oval brown blotch, which occupies the entire width of the segment; the head is testaceous-red, reticulated with a darker tint, and having a darker streak; the ventral area is greenish-yellow. In France it feeds on the endive (*Cichorium*), and *Asphodelus microcarpus*, not recorded as a British plant.

The MOTH appears on the wing in August. It was first taken at Yarmouth in Norfolk, and was described and figured by Mr. Curtis under the name of *Agrotis pascuea*, but Mr. Doubleday took one of the specimens to Paris, and found that it was the *Australis* of Boisduval; it has since been taken in Devonshire, Dorsetshire, Isle of Wight, Sussex, and Kent, but I believe nowhere north of these counties; neither is it recorded from Scotland or Ireland. (The scientific name is *Aporophyla australis*.)



484. The Small-mottled Willow (*Laphygma exigua*).

484. The Small-mottled Willow.—The palpi are very inconspicuous; they are curved

and ascending, very close together, and rather appressed to the face than porrected; the terminal joint is pointed; the antennæ are simple or nearly so in both sexes, those of the male are very slightly ciliated, and thus have an appearance of being rather stouter than those of the female: the fore wings have the basal portion nearly straight, the apical portion slightly arched, the tip blunt, and the hind margin slightly waved; their colour is gray-brown, with fulvous, pale gray, and dark brown markings; the orbicular has a fulvous area, with whitish border and a dark brown surrounding; between this and the base of the wing is a club-shaped mark with the same colouring, that is, the median area is fulvous, with white borders and dark surroundings; the reniform is dull fulvous, approaching to smoky-brown, but still having small portions of pure fulvous; it has pale borders; beyond the reniform is an interrupted zigzag line pale gray, almost white, and in spots pure white, but bordered interiorly with very dark brown; midway between this and the hind margin is a second pale line, very slender and zigzag; the costal margin is distinctly spotted, the pale gray and dark brown tints alternating with some regularity; on the hind margin are six crescentic spots very dark coloured, but bordered with pale gray on the interior side; there are other dark and pale markings on the disk and inner margin of the wing: the hind wings are very pale, semi-transparent, and slightly iridescent, the wing-rays and hind margin being decidedly darker; the outline of the hind wings is irregular and the fringe very long: the head, thorax, and body are of the same colour as the fore wings; the legs are sparingly clothed with scales, and of a pale gray colour with black rings.

At the meeting of the Entomological Society held on the 2nd March, 1859, Dr. Wallace, who took the female moth in the Isle of Wight, exhibited specimens which he had reared from the egg, and read the following description of the CATERPILLAR: "Pinkish-brown on the back, pinkish-yellow beneath; a row of black dots down the back; two rows on each side, between which are the white spiracles on rather a darker ground than that outside the rows of black spots; head and tail greenish; length when full-grown about an inch: it feeds on plantain, remaining during the day rolled up in the leaves or roots: the EGGS were laid about the 18th July, and hatched in about three weeks; the caterpillars were full-fed about the 12th of September, and the moths exhibited emerged about the 20th of October.

This very rare little *Noctua* was first taken at sugar at Ventnor, by Mr. A. Maitland, about eighteen years ago, and next by Mr. H. Cooke, near Brighton; after that near Worthing; and then three or four specimens by Dr. Wallace at Bembridge, in the Isle of Wight; three by Mr. Bond at Freshwater; and one or two by Mr. Rogers in the same locality; and, lastly, one by Mr. Fenn at Lewisham, near London. I am indebted to Mr. Bond for this list of localities, as well as for the loan of the moth to figure. (The scientific name is *Laphygma exigua*.)



485. The Bordered Gothic (*Neuria Saponariæ*).

485. THE BORDERED GOTHIC.—The palpi are slightly porrected in front of the head, the basal joints are very hairy, the terminal joint is short, naked, and truncate at the extremity; the antennæ are slightly ciliated in both sexes, but most so in the male; the eyes are very hairy; the fore wings have the costa straight, the tip blunt, the hind margin slightly scalloped; their colour is rich umber-brown, with very decided darker and lighter markings, the darker markings are almost black, the light ones pale wainscot-brown; the orbicular spot has a pale outline, the reniform a pale outline, and a pale central line; all the wing-rays are pale except a portion of each of the parallel rays near the hind margin; there are four pale transverse lines: the first

short, very crooked, and sharply angled, is almost close to the base; the second, which is curved, precedes the orbicular; the third is much bent and situated outside the reniform; the fourth is irregular but very distinct and parallel with the hind margin; the interior border of this last emits a series of black wedge-shaped spots, the tips of which point towards the middle of the wing; on the margin itself are seven black lunules with pale interior borders; the fringe is of two colours, pale inside, dark brown outside; the decided character of the markings give the fore wings a very beautiful appearance: the hind wings are dingy-brown, approaching to gray at the base, and having a crescentic discoidal spot and a broad but ill-defined marginal band darker; the rays passing through this band are very dark, and there is a marginal series of crescentic dark lines: the head and thorax are variegated with the two colours of the fore wings; the body is gray-brown.

Guenée describes the CATERPILLAR as short, stout, cylindrical, and smooth: it has a corneous plate on the second and twelfth segments; the head is moderately large, spherical, and dull in colour; the body is grayish-yellow or reddish (green when young), distinctly striated with brown, and having a medio-dorsal stripe slightly paler: the spiracular stripe and the ventral surface are pale gray without marking: the head and corneous plates are brown. It feeds on low plants, and particularly on the species of catchfly (*Silene*), and when full-fed turns to a CHRYSALIS beneath the surface of the ground.

The MOTH appears on the wing in July, and has been taken occasionally in most of the English counties south of Yorkshire. (The scientific name is *Neuria Saponariæ*.)

Obs.—*Saponariæ* is a moth of great beauty: its markings are very similar to those of *Popularis*; but the very distinct pale transverse lines which add so greatly to the beauty of *Saponariæ* are wanting in *Popularis*, and this difference serves at once to distinguish the two.



486. The Feathered Gothic (*Heliophobus popularis*).

486. THE FEATHERED GOTHIC.—The palpi are porrected and scarcely curved, the terminal joint is slender and naked; the antennæ are strongly pectinated in the male, quite simple in the female; the eyes are very hairy; the maxillæ are slender, short, and altogether insignificant: the four wings are straight on the costa, blunt at the tip, and waved on the hind margin; their colour is brown, with very pale wing-rays; the discoidal spots are very distinct; the orbicular is strongly outlined with pale wainscot-brown; the reniform is also strongly outlined, and is intersected by the white curved ray which closes the median cell; two double transverse lines of a very dark colour cross the wing, one of them before the orbicular, the other beyond the reniform; both of these are intercepted by the pale wing-ray; parallel with the hind margins a series of eight pale crescents; and on the hind margin itself is a series of very dark, almost black, crescentic lines; in the interspaces between the parallel wing-rays is a double series of dark brown spots, the interior series wedge-shaped, the exterior nearly round; they are separated by the intervention of the pale crescents already noticed: the hind-wings are brown-gray, paler at the base, with a crescentic discoidal spot and a pale fringe; the thorax is brown, with paler and darker lines, both on the front and sides; the body, which is very stout in the female, is ringed with two shades of brown.

Guenée describes the CATERPILLAR as obese, smooth, and almost cylindrical, but attenuated at both extremities, and having a spherical head; the colour of the head is gray, with

two black streaks; that of the body is a metallic bronze-brown, the dorsal being much deeper in colour than the ventral area; all the usual stripes are broad, well defined, of a dull white colour, and continuous, except where interrupted by dots of a rosy-brown colour; there are corneous plates of a shining black on the second and twelfth segments; the spiracles are entirely black. It feeds in April and May on grasses, and lives generally underground; it is a very pretty caterpillar, although its colours are dull, and delights to roll itself in a compact ring: it changes to a CHRYSALIS beneath the surface of the earth.

The MOTH appears on the wing at the end of August or beginning of September, and has been taken occasionally in most of our English counties and as far north as Perthshire; Mr. Birchall says it is common and generally distributed in Ireland. (The scientific name is *Heliophobus popularis*.)



487. The Beautiful Gothic (*Heliophobus hispidus*).

487. THE BEAUTIFUL GOTHIC.—The palpi are small and inconspicuous, the terminal joint naked; the antennæ are pectinated in the male, simple in the female: the fore wings are straight on the costa, rather pointed at the tip, and waved on the hind margin; their colour is umber-brown, with four transverse pale lines; the first is short, zigzag, and very near the base; the second is nearly direct, and situated before the orbicular; the third is much bent, and situated beyond the reniform; near the costa it bends towards the base of the wing; the fourth is very distinct, oblique, and parallel with the hind margin; the discoidal spots are pale and very distinct, and immediately below them is a forked wing-ray quite white, and there is a second white wing-ray parallel with the inner margin; there is a very dark slender waved line on the hind margin, and almost close to it a second slender line rather paler: the hind wings of the male are pale gray with a transverse median line darker, and the fringe paler: in the female the hind wings are darker; the head, thorax, and body are gray, the front and sides of the thorax lined with darker.

The CATERPILLAR is gray dotted with black, the medio-dorsal and sub-dorsal stripes more distinctly dotted (*Dup.*) (*Stainton's Manual*, vol. i., p. 204.) Mr. Doubleday has reared these caterpillars, and found they invariably feed on grass.

The MOTH appears in September, and has been taken, but not abundantly, in Devonshire and the Isle of Wight, but nowhere north of those counties. (The scientific name is *Heliophobus hispidus*.)



488. The Antler (*Charœas Graminis*).

488. THE ANTLER.—The palpi are slightly porrected, the terminal joint naked but not exceeding in length the hair-like scales of the preceding joint; the antennæ are pectinated in the males, the pectinations decreasing in length to the tip, which is very pointed; those of the female notched or serrated, each joint bearing a single hair: the fore wings are small and short, straight on the costa, and simple on the hind margin; their colour is reddish-brown, the orbicular spot is small and ovoid; the reniform is pale, and united at its lower extremity with a forked whitish incrassated wing-ray, which is continued to the base, where it unites with a second whitish wing-ray that passes above the orbicular; a third wing-ray of the same pale colour runs parallel with the inner margin; a pale brown transverse bar crosses the wing half way between the reniform and the hind margin; beyond this is a series of obscurely wedge-

shaped dark brown spots : the hind wings are pale at the base, and smoky-brown towards the margin ; the discoidal spot is very small and usually circular : the fringe is pale : the head, thorax, and body are brown ; the body having a tinge of rufous towards the extremity ; the sides and extremity of the body are clothed with long hair-like scales. The female is usually considerably larger than the male.

The CATERPILLAR lives almost entirely beneath the surface of the ground, in grass pastures, and its mode of life can only be inferred from this circumstance : the head is nearly equal in width to the second segment, it is very glabrous : the body is almost uniformly cylindrical ; the colour of the head is testaceous-brown ; of the body dingy gray-brown, with a medio-dorsal as well as a lateral stripe on each side yellowish ; on the second and thirteenth segments, respectively, is a glabrous plate, somewhat darker than the ground colour. It feeds on the roots of grass, and changes to a CHRYSALIS beneath the surface of the ground.

The MOTH appears on the wing at the end of August, or early in September, and is found more or less abundantly on commons, mountains, and meadows naturally clothed with grass. (The scientific name is *Charæas Graminis.*)

Obs. 1.—The caterpillar has always been notorious for the injuries it causes in grass lands. Linnæus emphatically says, "This is the most destructive of our Swedish caterpillars, laying waste our meadows and annihilating the crop of hay." In the years 1741 and 1778 its ravages were so great as to amount to a national calamity. Guenée observes that, although met with throughout Europe, including France, it has nowhere caused such a panic as in Sweden. Some authors have asserted that it spares the species of the genus *Alopecurus*, and others those of the genus *Trifolium*, but these assertions are not published on authority sufficiently reliable, since there is no evidence of care in the observation on which they are founded.

Obs. 2.—In the first volume of the *Entomological Magazine*, Mr. Wailes has published some remarks on this moth, which I consider of such general interest that I think no apology is needed for quoting them entire :—

"Though the devastations committed by the caterpillars of this moth in our island do not in general appear to bear any comparison with its ravages in the Swedish pastures, yet when, from the failure of some of the checks appointed for keeping it within proper bounds, the species is left to increase unmolested its effects are very apparent, as the following instance will show. Some years ago, during the spring and early summer, the herbage of a large portion of the level part of the mountain of Skiddaw, near the well which most tourists visit on the ascent, previous to climbing to the summit of the first *man*, comprising at least fifty acres, and extending some distance down the western side of the mountain, was observed, even from the town of Keswick, to assume a dry and parched appearance ; and so marked was the line, that the progress made by the caterpillars down the mountain could be distinctly noted. Nor was the change of colour of the herbage the only thing that attracted the attention of the good folks of Keswick ; large flocks of rooks, attracted, no doubt, by the abundance of food which these caterpillars afforded them, were every morning seen wending their way to the spot, both from the rookeries at Lord's Island and other places in the vale of Keswick, and also from those of distant ultramontane parts of the neighbourhood ; and, after spending the day in preying upon the unfortunate caterpillars, on the approach of night, rising in one dense cloud, and dispersing to their respective homes. Though the number of caterpillars must in this manner have been greatly reduced, yet I was informed, by a very intelligent friend residing at the foot of the mountain, that in August the moths literally swarmed throughout the neighbourhood. So completely was vegetation destroyed, that, on a visit to the spot in 1830, the extent of their ravages was distinctly visible, being very similar to the effect produced by the burning of heather, which is so

much practised on all our hills. Of course the quality of the newly-grown herbage was materially improved; thus affording another instance of indirect advantages derived from insects.

"Another very remarkable fact, illustrative of the natural habits of this moth, fell beneath my observation in the beginning of August, 1831. I was staying at Meldon Park on an entomological excursion, and, by chance, one morning visited some old pastures about a mile from that place—this was about eight o'clock—and my astonishment was very great to find the fields swarming with moths upon the wing. I managed to capture one with my hat, having neglected to take out my net, and was delighted to find it was a specimen of *Charœas Graminis*, of which I had only captured an occasional one or two, flying amongst thistles in the middle of the day. I returned to breakfast, fully calculating on getting an ample supply during the forenoon. Accordingly, big with expectation, and completely prepared for the onslaught, I reached the spot about ten o'clock; and if my first surprise on beholding the countless myriads in my morning walk was great, it was not less on my return to find that in the same place where, not three hours before, I could scarce step without treading on them, a single specimen was all that rewarded my incessant search for some hours, over the space of at least one hundred and fifty acres. Chagrined at my ill luck, I determined that the peep of the morrow's dawn should find me prepared to profit by the experience of that day; and, accordingly, taking an assistant with me, we reached the place early; but not a moth was to be seen. The wind had changed to the east, and the drifting mist threatened to end in rain; and having fixed that day for my return to Newcastle, I felt somewhat disappointed, and wandered over the ground in the hopes that some single specimen might venture forth, but in vain; not a solitary moth was to be seen. Despairing of success, and wet and uncomfortable, from the heavy dew on the grass, and moist fog overhead, about half-past seven I was about to return, when suddenly the whole field, as far as the eye could reach, was once more the scene of their gambols. Struck with the suddenness of their reappearance, and rejoicing at their unexpected return, I put Horace's truly entomological recommendation,

'Carpe diem, quàm minimum credula postero,'

into force. And now the difficulty was, not where to find a moth, but which one of the numberless thousands on the wing to select for an object of capture, as their flight was so rapid and irregular that the eye became bewildered with their motions, and, like the *Gyrini*, they were lost in the mazes of their evolutions. After securing what specimens I wanted, I could not help watching the scene before me; and, as in the study of all nature's works, the trouble, or rather the time spent, was more than amply repaid; for sudden as their appearance had been, their disappearance was equally so, when, as with one general consent, about half-past eight, they again settled; and their flight for the morning being over, scarcely a solitary specimen was anywhere to be made. The moths flew about three or four inches from the ground, and apparently very seldom alighted, but threaded their way most dexterously amongs the long culms of the grasses. I reached home, not only pleased with my capture, but infinitely more so with the interesting habits of this insect; and I regret that I have not had an opportunity of again witnessing them. The species, though common hereabouts, has been considered rare in the south of England, probably from entomologists being unacquainted with its habits."



489. The Feathered Ear (*Pachetra leucophœa*).

489. THE FEATHERED EAR.—The palpi are straight, and very slightly projecting; the

terminal joint is small and short; the antennæ are long, pointed, and strongly pectinated in the male, but simple in the female: the fore wings are ample, very nearly straight on the costal, and scalloped on the hind margin; their colour is gray, slightly tinged with ochreous, and clouded and variegated with brown; the discoidal spots are very conspicuous; they are of the same clouded gray colour as the rest of the wing, but their circumscription is white, and the ground colour surrounding it very dark; below the orbicular is a very dark and obtusely wedge-shaped spot pointing towards the hind margin; there are four double transverse lines, the first near the base, very short, bent, and imperfect towards the inner margin; the second before the orbicular, and united to the wedge-shaped spot; the third, which is much interrupted and oblique, beyond the reniform; and the fourth, which is very zigzag, and very pale, parallel with the hind margin; on this last are seated six or seven distinct and acutely wedge-shaped dark spots, all of them pointing towards middle of the wing; the costal margin is spotted with darker and lighter: the hind wings are cloudy gray, with the wing-rays, a crescentic discoidal spot, and a marginal line decidedly darker; their outline is waved; there is also an indistinct clouded band parallel with the hind margin, more particularly observable in the female; the fringe is spotted; the head and thorax are varied with gray and brown; the body is grayish-brown, with a medio-dorsal series of darker crests.

The CATERPILLAR has not been found in this country, but Guenée describes it as obese, velvety, and swollen posteriorly, and having small and short claspers, and a large and glabrous head of a light brown colour; the body is yellowish-gray, and striated, with a very conspicuous medio-dorsal stripe of a nankeen-yellow colour; the sub-dorsal stripe is less distinct, and the spiracular stripe melts gradually into the paler area beneath; the usual dots are extremely small and scarcely perceptible: the spiracles are strongly outlined with black: there is a shining brown plate on the second segment. It feeds in those tufts of grass which grow on commons and in dry woods, and lives through the winter from October till the following April. When full-fed, it makes a soft cocoon among mosses on the surface of the ground, and therein changes to a short, big-bellied CHRYSALIS, with the anterior part of each segment chagreened, and the extremity of the abdomen very blunt.

The MOTH appears on the wing at the end of June, and continues flying until the middle of July: the only British locality in which it has been known to occur is Mickleham, in Surrey, and here it has not been taken during the last seven years. Mr. Stevens has kindly sent me the following information for publication in this work:—"Whilst mothing on Mickleham Downs, early in July, about fifteen years ago, I boxed several moths that were flying round flowers then in bloom, and the next morning, when pinning my captures, I found amongst them a specimen of *Pachetra leucophæa*. For several years afterwards, during the same month of July, I succeeded in capturing a few more specimens, not more than fourteen or fifteen in all. For the last seven or eight years I have tried in vain. I have only heard of three more specimens besides those mentioned above: the last was taken about seven years ago." (The scientific name is *Pachetra leucophæa*.)



490. The Straw Under-wing (*Cerigo Cytherea*).

490. THE STRAW UNDER-WING.—The palpi are slightly curved and porrected, the terminal joint naked and pointed; the antennæ of the male are serrated, of the female simple; the fore wings are ample, very slightly arched on the costa, blunt at the tip, and waved on the hind margin; their colour is various, most

commonly bistre-brown of several shades, yet sometimes tinged with brick-dust red, and always having four transverse lines and the two discoidal spots mapped out, or, at least, indicated in pale brown, gray, or white; the first transverse line is close to the base, short and imperfect; the second, much angled, precedes the orbicular; the third follows the reniform, and is the most distinct; the fourth is parallel with the hind margin, vague, waved, broken, and often indistinct; the hind wings are straw-coloured, with a broad smoke-coloured marginal band; the margin is waved; the hind margin of all the wings has a delicately slender black line: the head and thorax are gray-brown, the tint produced by a diversity of colour in the scales; the body is gray-brown, the scales concolorous.

The CATERPILLAR is described by Guenée as elongate and cylindrical, smooth and shining; the head is pale, with two black lines down the face; the body is of a grayish yellow colour, excepting the three thoracic segments and the lateral area, which are wood-brown; all the stripes are conspicuous and blackish, the medio-dorsal is the most distinct, double, crowded with black dots, and velvety on the anterior part of each segment; the sub-dorsal stripe also is double, the spiracular stripe is bordered with black above. It feeds on the grasses which grow on dry and stony hills, and lives through the winter from September until the following April: the CHRYSALIS is subterranean.

The MOTH appears on the wing in July, and has been taken in most of our counties as far north as Kirkcudbrightshire; Mr. Birchall says it is common, and generally distributed in Ireland. (The scientific name is *Cerigo Cytherea.*)



491. The Flounced Rustic (*Luperina testacea*).

491. THE FLOUNCED RUSTIC.—The palpi are short and scarcely projecting; the antennæ are ciliated in the male, simple in the female: the fore wings are rather narrow, very straight on the costa, blunt at the tip, and slightly waved on the hind margin; their colour is testaceous, with several dark umber-brown markings, the most conspicuous of which is below the two discoidal spots, and has some resemblance to a capital letter I placed longitudinally; the disk of the reniform is paler than the ground colour of the wing; there is a series of crescentic dark brown spots beyond the reniform and the concavity of each crescent is occupied by a paler crescent; these markings are followed by a broad transverse paler band, and a darker and indented hind-marginal band: the hind wings are delicately pale, and exhibit the most slender trace of a darker discoidal spot, and a linear interrupted border: the head and thorax are testaceous brown, the body gray-brown.

"The caterpillar is dull flesh-colour, the head and the corneous plate on the second segment pale yellowish brown (*Treitschke*): on the lower parts of the stems of grass." (*Stainton's Manual*, vol. i. p. 206.)

The MOTH appears on the wing throughout August and September, and is common in England, Scotland, and Ireland. (The scientific name is *Luperina testacea.*)



492. Dumeril's Luperina (*Luperina Dumerilii*).

492. DUMERIL'S LUPERINA.—The palpi are short and scarcely projecting, the antennæ are ciliated in the male, simple in the female, the fore wings are rather narrow, very straight on the costa, and scarcely waved on the hind margin; their colour is testaceous brown, with a darker median band, and a darker but narrow hind-marginal band: the discoidal spots are very distinct and very pale; the

orbicular is oblong and oblique, the median wing-ray on which they rest is quite white, and emits two white branches, there is also a perfectly white wing-ray parallel with the hind margin : the hind wings are extremely pale wainscot-brown, slightly clouded towards the hind margin in the female : the head and thorax are testaceous brown ; the body pale wainscot-brown.

Two specimens of the MOTH are said to have been taken in the Isle of Portland by Mr. Seeley ; one of them is in Mr. Bond's collection. (The scientific name is *Luperina Dumerilii.*)

Obs.—The specimen figured and described is one of a fine and valuable series from the Continent, kindly lent me by Mr. Doubleday.

493. GUENÉE'S LUPERINA.—" Thorax pale griseous, mixed with white : body very pale : fore wings pale testaceous, irrorated with black and white atoms—an indistinct interrupted pale striga before the middle—then a second arcuated striga composed of black lunules, edged externally with whitish ; the first striga terminates in a rather conspicuous black dot on the inner margin of the wing, the ordinary discoidal spots are placed between these strigæ, the reniform one being distinctly edged with white. Between the black dots on the inner margin of the wing and the thorax is a slender black line. Hind margin pale testaceous, with an indistinct undulating pale line, commencing at a pale patch on the costa near the apex. A distinct row of black marginal lunules ; fringe spotted with deep and pale fuscous : on the costa near the apex are two oblique white spots : hind wings pure white in both sexes, with black marginal lunules ; antennæ of the male rather strongly ciliated.

" Three specimens of this insect were taken in Wales in the autumn of 1862 ; it is closely allied to *Luperina testacea*, *L. Nickerlii*, and *L. Desyllesi*, but is apparently distinct from either. The Rev. Henry Burney most kindly sent me his pair for examination, and allowed me to forward one of them to my valued friend, M. Guenée, who informs me that it is identical with a specimen in his cabinet taken in France, which is described in his works as '*Luperina testacea, var. A,*' accompanied by a remark that it will probably prove a distinct species. In this remark I coincide, and with the consent of Mr. Burney, I propose to name it after my friend.

" It differs from *L. testacea* in the thorax and abdomen, being slenderer, in the peculiar mottled appearance of the fore wings, and in the absence of the three round white dots on the costa, near the apex, which are so distinct in *L. testacea* and *L. Nickerlii.* The hind wings in both sexes are of a much purer white than in *L. testacea.*"

Of this species I have no knowledge whatever beyond what is conveyed in Mr. Doubleday's original description, which I have copied from the *Entomologists' Manual* for 1864, p. 123. (The scientific name is *Luperina Guenéei.*)



494. The Hedge Rustic (*Luperina Cespitis*).

494. THE HEDGE RUSTIC.—The palpi are inconspicuous, they scarcely project beyond the head ; the antennæ are ciliated in the male, simple in the female ; the eyes are very hairy : the fore wings are ample, straight on the costa, and blunt at the tip ; their colour is opaque bistre-brown, the discoidal spot clearly mapped out in white, and there are three distinct transverse lines, the first is before the orbicular ; the second beyond the reniform ; and the third, which is broken up into crescentic spots, is parallel with the hind margin ; each of these lines is double, that is, consists of two portions, the one darker, the other paler than the ground colour ; the first has the pale portion towards the base, the second and third towards the hind margin ; the hind wings of the male are very pale, almost white, sometimes with one,

sometimes two darker bars, parallel with the hind margin: in some specimens I find scarcely any trace of these bars; but there is always a slender dark brown line on the extreme margin: the hind wings of the female are clouded with smoky brown: the head and thorax have exactly the same colour as the fore wings; the body is pale dingy-brown.

"The EGG is at first pale straw-colour, soon turning pale purplish brown, and again becoming dingy-gray a long time before the caterpillars appear: this is singular, for the last change of colour usually precedes the hatching of the caterpillar but a few days or hours at the outside. The CATERPILLAR at first is a little dingy fellow, but after a moult or two, puts on the gayest dress worn in all its existence, becoming of a clear full green, with white medio-dorsal, sub-dorsal, and broader spiracular lines." Thus writes the Rev. John Hellins, one of our very best observers, in the *Entomologists' Monthly Magazine*, vol. iii. p. 212. In June, 1866, I received some of the full-grown caterpillars from a friend who dug them up in a meadow which had been completely laid waste by the ravages of caterpillars, and had assumed the appearance of a scorched desert: the caterpillars of an *Agroti* hereafter to be described were the main agents in this devastation, but they were intermixed with others more attractive in appearance, which subsequently proved to be those of *Luperina Cespitis*. The head of these was rather narrower than the second segment, the face flat, and the whole glabrous; the body is almost uniformly cylindrical, but slightly decreases in bulk towards each extremity; on the second segment is a semi-circular glabrous plate, and there is another on the thirteenth segment; the colour of the head is dingy-brown, and that of the two dorsal plates is darker brown, the rest of the dorsal surface has a metallic bronze-like lustre with five dingy-white stripes, one of them medio-dorsal, the others lateral; the ventral surface and claspers have a semi-transparent greenish tint; the legs are corneous as usual, and of a rather darker colour. It feeds on grass, and exclusively by night, either burying itself in the earth or hiding at the roots of the grass by day; about midsummer my specimens finally entered the earth and formed themselves earthen cells, without any perceptible admixture of silk or gum, and in these they changed to shining red-brown CHRYSALIDS, having an anal spike forked, or, perhaps, more properly speaking, bearing two sharp bristles at the extremity.

The MOTH appears on the wing in August, and, although never abundant, has been occasionally met with in many of our English counties, Hampshire, Sussex, Kent, Surrey, Essex, Suffolk, Worcester, Lancashire, York. Mr. Birchall informs us it is abundant on the Irish coast near Dublin. (The scientific name is *Luperina Cespitis.*)



495. The Crescent-striped (*Mamestra abjecta*).

495. THE CRESCENT-STRIPED. — The antennæ are rather long, and almost simple in both sexes; the palpi are curved upwards, naked, and widely-separated at the tips: the fore wings are rather long, rather narrow, and slightly waved on the hind margin; their colour is dingy brown; the orbicular spot is oblong and oblique, its border whitish, and rendered more conspicuous by the dark, but narrow, area immediately around it; the reniform is irregular, its colours the same as those of the orbicular, except that it has two white dots at its lower exterior extremity; beyond this are two oblique transverse paler lines, the outer of which is zigzag, and the inner is accompanied by several dark lunules, and there are three, as is usual in this tribe, rather conspicuous pale dots on the costal margin near the tip; the hind wings are pale grayish-brown, with darker wing-rays and hind margin, and paler base; the head and

thorax are of the colour of the fore wings, the body of the hind wings.

The MOTH appears on the wing in July, and is said to occur in several of our English counties; but it seems to be very local and so imperfectly known that the recorded habitats must be received with great doubt; it is certainly abundant on the banks of the Thames near Gravesend, and also on the Irish coast near Waterford. (The scientific name is *Mamestra abjecta.*)

Obs.—This obscurely-marked insect is the *Noctua lunulina* of Haworth (*Lep. Brit.* p. 192, No. 92).



496. The Large Nutmeg (*Mamestra anceps*).

496. THE LARGE NUTMEG.—The antennæ are rather long, and almost simple in both sexes; the palpi are short, the tips naked and distant: the colour of the four wings is pale dingy-brown, tinged with ochreous; the ground colour of the orbicular and reniform spots is scarcely different from that of the rest of the wing, but the border of the reniform is almost white; there is an irregular paler band, parallel with the hind margin, accompanied on the outside by a slender zigzag line of the same colour, which, below the middle, projects two teeth or angles to the hind margin itself: the hind wings are pale gray-brown, with a darker hind-marginal band and darker wing-rays: the head and thorax are exactly of the same colour as the fore wings, the body of the same colour as the hind wings.

The MOTH appears on the wing in June, and is common in most of our English counties, it is also reported from Scotland, and Mr. Birchall says it is common on the Irish coast near Dublin. (The scientific name is *Mamestra anceps.*)

The CATERPILLAR of this moth is very imperfectly known. Mr. Stainton, citing Borkhausen, says it is "pale brown, with three faintly darker streaks; the spots black, the second and anal segment black;" food unknown. (*Stainton's Manual*, vol. i. p. 208.)

Obs. This species is certainly the *Noctua contigua* of Haworth (*Lep. Brit.* No. 91); but that name will occur farther on applied to another species.



497. The White Colon (*Mamestra albicolon*).

497. THE WHITE COLON.—The antennæ are rather long and nearly simple in both sexes; the palpi are inconspicuous: the fore wings are rather ample, their colour is dark gray-brown, mottled and marbled with darker colours; the markings being generally sharp and well-defined; the orbicular spot is nearly circular, and of the ground colour; the reniform is rather elongate, and has two white dots at its lower outer extremity; these are placed one above the other, and resemble the colon (:) used in printing: parallel with the hind margin is an irregular transverse series of whitish or ochreous spots: the hind wings are gray-brown; darker towards the hind margin and apical angle; the wing-rays also are conspicuously darker: the head and thorax are of the same colour as the fore wings, as are also the tips of the crests on the body; the rest of the body is of the same colour as the hind wings.

The EGGS are laid in June, in waste places, on various species of *Atriplex* and *Chenopodium*, and in gardens on lettuce and other esculents: the CATERPILLAR is full-fed about the end of July, when it falls from its food-plant and rolls itself in a compact ring if disturbed. The head is rather narrower than the second segment; and the body is almost uni-

formly cylindrical, very smooth and velvety, and slightly decreasing towards either extremity: the colour of the head is pale semi-transparent green, and glabrous: the second segment has on its anterior margin a crescentic glabrous plate, resembling the head in colour; the body is grass-green, with a medio-dorsal stripe slightly darker, and intersected by an extremely narrow paler stripe on each side just below the spiracles, and, touching all of them except the first and ninth, is a pale stripe, intersected by a darker stripe; the claspers and legs are concolorous with the body.

The MOTH appears on the wing in May and June, and has been taken in Devonshire by Mr. Matthew, in Somersetshire by Mr. Crotch, in Cheshire and Lancashire by Mr. Birchall, in Northumberland, Durham, and the Lake District; it is also exceedingly common on the Irish coast near Dublin. (The scientific name is *Mamestra albicolon*.)



498. The Confused (*Mamestra furva*).

498. THE CONFUSED.—The antennæ are slightly ciliated in the male, and of a testaceous brown colour; the palpi are very inconspicuous: the colour of the fore wings is dark gray-brown, obscurely mottled and marbled with darker markings; the reniform and orbicular spots are confused, and have no white or light borders; parallel with the hind margin is a pale interrupted line, or rather a series of pale linear spots: the hind wings are dingy gray-brown, paler at the base, and having darker wing-rays: the head and thorax are of the same colour as the fore wings; the body of the same colour as the hind wings.

The CATERPILLAR is thus described by Guenée—"Vermiform, shining, transparent, and of a dull violet-brown colour, with the usual somewhat wart-like spots, as well as the heap, the plates of the neck and twelfth segment, and the spiracles shining black. It lives in June concealed at the root of grasses, especially *Aira canescens* in the manner of *Xylophasia polyodon* and *X. lateritia*, both of which it much resembles."

The MOTH appears on the wing in July, and is said to have been taken in Devonshire, Somersetshire, Kent, Berkshire, Suffolk, Worcestershire, Shropshire, Derbyshire, Yorkshire, the Lake District, Scotland, and Ireland: it is certainly very local, and is imperfectly known, one of the varieties of *Apamea gemina* hereafter to be described, being constantly sent under the name of *Furva*: on this account I receive all reports of its capture with distrust unless accompanied with specimens. (The scientific name is *Mamestra furva*.)

Obs. This confused and obscurely-coloured moth is not noticed by Haworth or Stephens, and, therefore, I believe has received no English name prior to that now given.



499. The Cabbage Moth (*Mamestra Brassicæ*).

499. THE CABBAGE MOTH.—The antennæ are rather long and slender, and scarcely ciliated in either sex: the fore wings are dark smoky gray-brown, mottled and marbled with confused markings, both darker and paler; the orbicular spot is inconspicuous, but decidedly to be traced; the reniform is delicately outlined with white or whitish gray, and has a pale interior disk, in which the same pale gray colour predominates: the hind wings are dark smoky-brown, with rather pale base, and rather darker crescentic discoidal spot and wing-rays: the head, thorax, and body have the same colour as the fore and hind wings.

The EGG is laid on the cultivated varieties of *Brassica*, as summer cabbage, brocoli, cauli-

flower, seakale, &c., and the young CATERPILLAR emerges in a few days, and immediately commences its destructive career. I am unable to give a precise date for oviposition, or for the emergence of the caterpillar, having observed them feeding throughout the summer and autumn. In a perfectly natural state this caterpillar devours the leaves of almost every herb, particularly the various species of *Chenopodium* and *Rumex:* in the garden it is excessively destructive, having an insatiable appetite, which it seeks to indulge, without intermission, day and night; it spoils even more than it devours, gnawing its way into the very heart of our cabbages, and filling its galleries with watery and disgusting excrement; it is next to impossible to rid the cabbages of their unwelcome tenant, which continually escapes the vigilant eyes of the cook, and, boiled to death in the midst of its noxious career, is served up as an almost inevitable concomitant of summer cabbage. It is, however, by no means confined to the interior, but may be found feeding exposed on cabbages, dahlias, geraniums, marygolds, and almost every plant, useful or ornamental, that the garden produces. When full-fed, it rolls itself into a compact ring if annoyed, and remains in that position for a considerable time; when crawling, the head is somewhat porrected. The head is scarcely so broad as the body, and is partially received into the second segment; the body is cylindrical, smooth, and velvety; the twelfth segment is slightly incrassated dorsally. The head is very glabrous, testaceous, reticulated, or marbled with darker brown; the body usually divided longitudinally into two equal regions as regards colour; the dorsal region, including the spiracles, is olive-brown; the ventral region dingy yellow; the division between the two colours is usually abrupt and clearly defined, and extends throughout the length of the caterpillar from the head to the end claspers; on the back of every segment is a somewhat obscure triangular mark pointing backwards, and rendered more conspicuous by being bounded by a lighter shade; in each triangle are two white dots placed transversely; the spiracles are also white; the legs and claspers are of the same colour as the ventral surface. Such is a description of the normal and more marked colouring of this ubiquitous caterpillar, but it varies infinitely; in some examples there are evident black dorsal markings on each side of each segment, except the twelfth, and on that a large square black patch, of which the hinder and lateral margins are well defined, but not the anterior margin; in others the olive hue of the back is replaced by a clear brown, and again in others the entire body is of a pale and perfectly uniform dingy-green. The caterpillar changes to a brown and glossy CHRYSALIS in the earth, and remains in that state throughout the winter. During the autumnal and winter garden-digging, the chrysalids are turned up by hundreds, and might then be readily collected; they are a favourite food of all kinds of poultry—fowls, guinea-fowls, pea-fowls, and pheasants devour them with the greatest avidity.

The MOTH appears on the wing continuously during the summer and is common in England, Scotland, and Ireland. (The scientific name is *Mamestra Brassicæ.*)



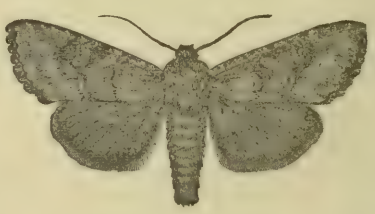
500. The Dot (*Mamestra Persicariæ*).

500. THE DOT.—The antennæ are long, and very slender towards the tip, those of the male are very slightly ciliated; the fore wings are ample, rather pointed at the tip, and slightly waved on the hind margin, their colour is very rich dark bistre-brown, frequently variegated with rich chestnut; the orbicular spot is circular, but very indistinct, its outline is sometimes indicated by a few white scales; the reniform is very bright and conspicuous; it is of a pure white, excepting a cloud in the centre, which takes the form of the exterior outline, and varies in tint from a dingy smoke-

colour to a rich chestnut-brown; there is a conspicuous but small pale spot on the costa immediately above the reniform, and other smaller ones nearer the tip; there is also an irregular series of yellowish dots on the disk of the wing parallel with its hind margin: the hind wings are pale towards the base, very dark smoky-brown towards the hind margin, this colour forming a broad band; the crescentic discoidal spot and wing-rays in the pale portion of the wings are darker: the thorax, which has a double crest in front, is dark bistre-brown; the body is smoky gray-brown, with a ferruginous tuft at the base; the tip has a triple tuft in the male, the median lobe being erected, the lateral lobes arched.

The EGG is laid in June and July, and the young CATERPILLAR emerges toward the end of the latter month; when full-fed it rolls itself in a tight ring if disturbed, and falls to the ground; the head is rather small, and partially withdrawn into the second segment when at rest; the body is smooth, very stout, and somewhat attenuated anteriorly; the twelfth segment is the largest, tumid and obtusely humped: the colour is various, bright green, dingy green, rosy brown, or dark brown; as in many other cases where this difference of colour prevails, the brown specimens generally produce males, the green ones females; in the following definition I describe only the intensity, not the colour of the markings. The head shining, pale, mottled with darker; the second segment has a nearly square dark velvety patch on the back, bounded on each side by a longitudinal white line, and being intersected in the middle by a third longitudinal white line; a pale narrow median stripe commences at the termination of this short white line, and terminates on the twelfth segment; on each side are two series of oblique dark markings; those of the upper series commence on the fifth segment; and are continued to the twelfth segment, each commencing about the middle of the side, pass obliquely upwards and backwards to the median stripe, and there meet a corresponding marking on the opposite side, thus forming a series of V-shaped markings, the points of the V's directed backwards; those V's on the fifth and sixth segments have the greatest intensity; the twelfth segment is also much darker than the rest, but the dark portion has lost the V-shape; there is a slender dark rivulet stripe on each side below the V-shaped markings, and from this descend five other oblique markings, taking an opposite direction to the upper ones, and terminating in the claspers; in the upper part of each of these is situated a white spiracle; the twelfth segment has a pale squarish patch behind; the anterior part of the body is dark beneath. It feeds on a great variety of plants, and is particularly fond of elder; is full-fed at the end of September, and buries itself in the earth in order to undergo the change to a CHRYSALIS.

The MOTH appears at the end of June, and is common throughout July in most of our English counties, and extends also into Scotland; but Mr. Birchall did not meet with it in Ireland. (The scientific name is *Mamestra Persicariæ*.)



501. The Rustic Shoulder-Knot (*Apamea basilinea*).

501. THE RUSTIC SHOULDER-KNOT.—The antennæ are slightly ciliated in the male; the palpi are porrected and prominent, the second joint densely clothed with scales, the terminal joint very distinct and almost naked: the fore wings have the hind margin slightly waved; their colour is pale ochreous-brown, marbled with shades of greater or less intensity; the orbicular is rather oblique and very indistinct; the reniform is more clearly defined, its border outlined in dingy white, and the lower half of its area filled with smoky-brown; there is a short black line at the base directed towards, but not nearly reaching, the middle of the wing; this black line is slightly elbowed in the middle, and often emits at the elbow a

very short branch : the hind wings are more dingy than the fore wings, but of very similar tint : the head and thorax are ochreous-brown ; the body rather pale.

The EGGS are laid on the ears of wheat in little clusters, generally in sufficient number to supply one or more CATERPILLARS when hatched to every grain in the ear ; then they penetrate the grains, and consume the contained flour as soon as it has commenced to become solid, leaving the cuticle of the grain, as well as the chaffy husks with which it is enveloped, perfectly intact, with the exception of the very small aperture through which it escapes. As soon as the caterpillar is too large for the grain to contain, it introduces itself between the husk and the beard of the ear, in which situation it cannot be detected without difficulty, being exactly similar in colour : this occurs at harvest-time. It then allows itself to be hidden in the sheaves, and is housed with the corn : if we examine the floor of the barn where the wheat is threshed, we find these caterpillars, then about the thickness of a straw, expelled by the stroke of the flail, crawling about in multitudes. The time has now arrived when its destructive propensities have ceased : the grains have acquired the required hardness, and the lower temperature of approaching winter serving to benumb the caterpillars, each constructs a little cocoon in which to pass the cold season. No sooner has the spring arrived, bringing with it a rapid vegetation, than they change their manner of life altogether ; they forsake the granaries and barns, and, wandering into the fields and hedge-rows, attack and devour the roots and lower leaves of many herbaceous plants ; they still grow somewhat slowly, and now assume the usual habits and appearance of the other *Apameas ;* for up to this period they have possessed all the characteristics of the caterpillars *Leucanias* or of young *Dianthecias ;* so true it is that the food and economy of caterpillars exercise a great influence on their forms as well as colours. They now attain their full size, and are to all appearance, genuine *Apameas ;* they feed almost entirely by night, concealing themselves in or near the ground by day ; they rest in a straight position, but roll themselves in a compact ring when disturbed or annoyed. The head is shining, and rather narrower than the second segment into which it is partially withdrawn when at rest ; the body is obese and almost uniformly cylindrical. The colour of the head is pale semi-transparent brown, slightly reticulated with darker brown : there is a rather narrow mediodorsal stripe of a dull yellow colour, and a similarly-coloured lateral stripe on each side, the interspace being occupied by a darker ground-colour, interrupted by a longitudinal series of black spots ; the spiracles are black, and situated in a palish stripe of a dingy white, the ventral area and claspers being nearly of the same colour. In this state the caterpillar finally buries itself in the ground in the month of March, and forming an earthen cell rather than cocoon, changes to a brown shining CHRYSALIS.

The MOTH appears on the wing at the end of May and during June : the females may then be seen flying over the wheat-fields and commencing the work of destruction by depositing their eggs in the ears. It is but too common everywhere, and is one of the most destructive of all our *Noctuas.* (The scientific name is *Apamea basilinea.*)



502. The Union Rustic (*Apamea connexa*).

502. THE UNION RUSTIC.—The antennæ are simple in both sexes, but rather stouter in the male ; the palpi are porrected and very slender at the tips : the colour of the fore wings is gray, with a median band which is altogether darker than the ground colour, but more especially so towards the inner margin where the bands are contracted, and the dark colour forms a decided blotch ; the costal portion of the band includes the two discoidal spots ; the orbicular is clearly defined, it has a gray circumscription and a clouded median

area; the reniform is gray and very imperfecly defined: the hind wings are dark gray-brown, rather paler towards the base, and have an indistinct crescentic discoidal spot; the head is gray; the thorax gray, often with a reddish median tuft; the body gray, with a reddish tuft at the base.

The MOTH appears on the wing in June and July; it has been taken in some abundance in Yorkshire, and is recorded as occurring in other English counties. Mr. Douglas Robinson mentions it as a native of Kirkcudbrightshire, but Mr. Birchall omits it in his Irish list. (The scientific name is *Apamea connexa.*)



503. The Dusky Brocade. (*Apamea gemina.*)

503. THE DUSKY BROCADE.—The antennæ are almost simple in both sexes; the palpi are porrected, but not prominently so, they are naked at the tip: the colour of the fore wings is so different that it is necessay to describe two varieties; the first (represented in the upper figure) has two very different shades of colour; there is a large blotch at the base, not reaching the costa or inner margin; a second blotch on the costa descending between the discoidal spots, and abruptly terminated below these spots by a blackish and straight streak, and a hind marginal band dark bistre-brown; the remainder of the wing being pale ochreous-brown; both discoidal spots are of the same pale colour, and have a pale gray circumscription: the second variety (represented in the lower figure) is of a smoky bistre-brown colour, almost uniform throughout; the discoidal spots scarcely perceptible; and the only distinct and constant marking being a pale angled line, parallel with the hind margin: the hind wings are smoky gray-brown, paler at the base, with darker wing-rays and crescentic discoidal spot; the fringe is pale, the outer portion almost white: in both varieties the head and front of thorax are pale, the disk of the thorax is dark brown, and has a short bifid crest in front; the body is paler, slightly crested, the crests being slightly darker.

The EGGS are laid in July and probably also in August on the culms of grasses of various species, and the young CATERPILLARS emerge in August and September; they hybernate at the roots of grasses when very small, and feed again in April, becoming full-fed in May; they eat mostly by night, concealing themselves by day; when disturbed, they fall to the ground rolled in a compact ring: the head is shining, and narrower than the second segment, into which it is partially received; the body is obese and soft, it is of a dark smoke-colour, with a paler medio-dorsal stripe, and a paler lateral stripe, the space between which two stripes has a series of black spots; in the region of the spiracles is a still paler and rather ochreous stripe, in which are the black spiracles, above each of which is a black spot.

The MOTH appears on the wing in June and July, and occurs almost everywhere in the United Kingdom. (The scientific name is *Apamea gemina.*)

Obs. I believe that my predecessor has given three English and three scientific names to this variable species. The Brown-Pinioned Brocade (*Noctua oblonga, Lep. Brit.* No. 78); the Gothic Brocade (*Noctua remissa,* No. 79); and the Dingy Brocade (*Noctua obscura,* No. 80) Mr. Stephens has called it the Dusky Brocade (*Hama furva*). This is one of those cases in which there seem to be two distinct types of ornamentation, which in their extremes must pass for species, but which seem connected by intermediates of less frequent occurrence than either of the types.



504. The Small Clouded Brindle (*Apamea unanimis*).

504. THE SMALL CLOUDED BRINDLE.—The palpi are porrected and conspicuous, the second joint densely clothed with scales, the apical joint rather long and naked; the antennæ are simple and slender; the colour of the wings is umber-brown, marbled with a few waved transverse lines of darker brown and a few pale bent lines exterior to the reniform; the orbicular is rather oblique, and very difficult to make out; the reniform very clearly defined, and having a white circumscription, which is particularly conspicuous on its outer border; the hind wings are gray-brown, paler at the base, and having a distinct crescentic discoidal spot: the head and thorax have exactly the colours of the fore wings; the body that of the hind wings.

The CATERPILLAR of this moth is unknown to me. Mr. Stainton gives Freyer as his authority for the following description:—"Dull gray; white dorsal line; a row of black dots between it and the whitish sub-dorsal line; spiracular line whitish. Feeds on grass." (*Stainton's Manual*, vol. i. p. 211.)

The MOTH appears on the wing in July, and has been taken in Devonshire, Somersetshire, Sussex, Surrey, Essex, and occasionally in more northern counties, extending even into Scotland; and Mr. Birchall has taken it in the counties of Dublin and Wicklow, in Ireland. (The scientific name is *Apamea unanimis*.)

Obs. — It must be admitted that this insect very closely resembles the preceding. It may, however, be distinguished by its larger size, and much greater constancy of colouring.



505. The Double-lobed (*Apamea ophiogramma*).

505. THE DOUBLE-LOBED. — The palpi rather long and porrected, slender at the base, then swollen, and again slender and naked at the tip; the antennæ are slender and simple: the fore wings are dark brown on the costa; this colour descends in a kind of festoon below the middle of the wing, and enclosing both the discoidal spots, which are rather obscurely indicated, again ascends, terminating in a point on the costa very near the tip of the wing: below this large dark area the inner-marginal area is pale gray: there is a brown shade about the middle of the hind margin, and a brown dash at the anal angle, which approaches the inferior border of the dark brown area first described: the hind wings are dingy gray-brown, as well as the head, thorax, and body.

The MOTH appears on the wing in June, in the gardens of Kent and Surrey, Essex and Middlesex, in the immediate neighbourhood of London. Mr. Douglas Robinson informs me that it has been taken in Kirkcudbrightshire; and Mr. Birchall says that there is one specimen in the collection of Trinity College, Dublin, captured by Mr. Tardy. (The scientific name is *Apamea ophiogramma*.)

Obs.—In this, as in many other instances, the number and perseverance of entomologists resident in London has given to this species the reputation of being a London insect *par excellence*, a reputation which will, in all probability, be shaken as entomologists increase in number at a distance from the metropolis: in London, supposing the number of industrious entomologists only keeps pace with the population, our records ought to exceed tenfold that of any other city in the empire.

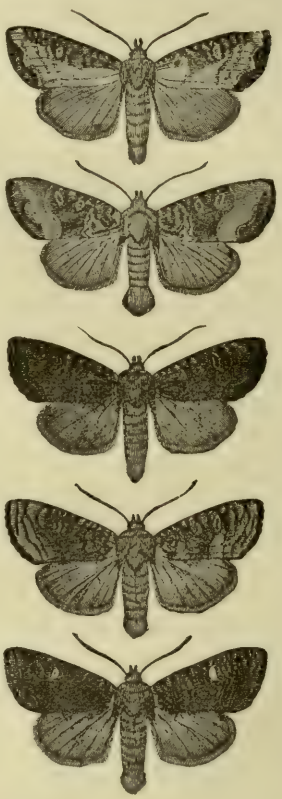


506. The Crescent (*Apamea fibrosa*).

506. THE CRESCENT.—The antennæ are nearly simple in both sexes; the palpi are porrected and naked at the tip: the fore wings are rather pointed at the tip, and rather concave below the tip; as regards colour, there are two very distinct varieties of this insect; in the first (represented in the upper figure) the inner margin and a broader band parallel with the hind margin, are pale gray brown, the hind margin itself, and all the basal area of the wing being umber-brown; somewhat marbled with other tints: in the second variety (represented in the lower figure) the fore wings are uniform umber-brown; the orbicular spot is very obscure, the reniform very distinct, sometimes altogether of a snowy whiteness; sometimes its circumscription and a central line only are white; but I almost invariably find that the wing-rays proceeding from its lower extremity are pure white for a short distance: the hind wings are gray-brown: the head, thorax, and body are of the colour of the wings.

The CATERPILLAR is an internal feeder, living concealed in the flowering stems of the common yellow flag (*Iris pseudacorus*), and devouring the pith: it has a brown shining head, and a whitish maggot-like body, with a dark brown dorsal plate on the second segment.

The MOTH appears on the wing in July. All my specimens came from the fens of Cambridgeshire, where it appears to be abundant; it has also been taken in Sussex, Surrey, Essex, Suffolk, Norfolk, and Yorkshire. (The scientific name is *Apamea fibrosa.*)



507. The Common Rustic (*Apamea oculea*).

507. THE COMMON RUSTIC.—The antennæ are slender and simple, those of the male scarcely different from those of the female; the palpi are porrected, and the tips naked: the fore wings have the tips blunt, and the outline of the fringe scalloped; their colour is remarkably inconstant, it has not a single character by which the species can be with certainty distinguished; the most common colouring appears to be umber-brown, with a darker median band more or less distinct; but in many specimens there is not the slightest trace of this band; another very distinct variety has the whole of the inner margin of the wing ochreous-brown, which colour, passing under the reniform, ascends obliquely to tip of

the wing, leaving a broad dark brown costal area, and a dark brown hind margin; the orbicular spot is very seldom clearly defined, often entirely imperceptible; the reniform is generally well defined, its circumscription pale, and its disk occupied by a crescentic pure white spot; sometimes, however, this conspicuous character is wanting, the white being confined to a mere line, and sometimes it is replaced by an ochreous spot: the hind wings are dark smoky-brown: the colour of the head and thorax varies as much as that of the fore wings: in some specimens there is a median elongate pale blotch on the thorax, in others a ferruginous tuft at the base; the body is slightly crested, and is almost invariably of the same dull colour as the hind wings.

I am by no means certain that I know the CATERPILLAR of this ubiquitous insect. Three years back I possessed a number of caterpillars which I supposed to be this species, but after feeding upon sods of grass, they finally entered the earth, turned to CHRYSALIDS, and so died: they were putty-coloured, with a black glossy plate on the second, and a smaller one on the twelfth segment; there was a very indistinct medio-dorsal and another lateral stripe. (See *Stainton's Manual*, vol. i. p. 211, where the description is rather different. The scientific name is *Apamea oculea*).

Obs. My predecessor divides this protean species into five — the Flame Furbelow (*Noctua furca*, *Lep. Brit.*, No. 136); the Russet (*N. rava*, *Lep. Brit.*, No. 137); the Letter I (*N. I-niger*, *Lep. Brit.*, No. 140); the Common Rustic (*N. oculea*, *Lep. Brit.*, No. 141); and the Rustic Mourner (*N. lugens*, *Lep. Brit.*, No. 142); in addition to which he describes thirteen varieties, designating them by letters of the Greek alphabet: our collections are now so much more extensive than in the time of Mr. Haworth, that these species and varieties are shown to be connected by intermediates, thus rendering the descriptions useless: it were a hopeless task, the endeavour to describe every individual of the species which differed from the rest.



508. The Marbled Minor (*Miana strigilis*).

508. THE MARBLED MINOR.—The palpi are porrected and curved upwards; the antennæ are rather stout in the males, slender in the females: the fore wings are slightly prolonged but not pointed at the tip; their colour is usually dark brown, marbled with white, but the variation in colouring is so great that it may truly be said that two specimens cannot be found alike; a conspicuous whitish bar usually crosses the wing parallel with the hind margin; this is elbowed below the middle, irregular and toothed; this white bar is particularly bright near the inner margin, and on the said inner margin, half way between this bar and the base, are two white linear marks, which indicate the commencement of two irregularly elbowed and approximate white lines, which in some specimens ascend to the costa, and in others are entirely wanting; in the specimens possessing these white markings the discoidal spots are also outlined in white, but in others no markings are distinctly visible, the entire wing being suffused with black more or less shaded and tinted with ferruginous-brown: the hind wings are always dark smoky-brown: the body has a medio-dorsal series of very distinct crests.

The CATERPILLAR has a small shining head, narrower than the second segment; the body is stout, smooth, and rests in a bent position in the interior of the stems of the larger grasses; it is attenuated at both extremities:

there is a corneous dorsal plate on the second and twelfth segments. The colour of the head and of these dorsal plates is dingy-red; of the body pale grayish-green, but varying to different tints in different specimens; there are traces of five longitudinal stripes paler than the ground colour, but these are very indistinct; these stripes are studded with minute warts, each of which emits a short stiff black hair; the spiracles are black and connected by a dark stripe; the ventral is paler than the dorsal area, its colour is inclining to dingy ochreous-green. When full-fed it leaves the grass on which it has been feeding, and descending to the earth forms an oval cell in the ground, and in this changes to a small and reddish CHRYSALIS of rather slender form: these may frequently be dug up in gardens, especially those in which weeds have been allowed to get too much ahead.

The MOTH appears on the wing in June and July, and is abundant in most of our English counties: in South Wales, Monmouthshire, Herefordshire, it flies in the day-time over the ripe grass when ready to cut, and is accompanied by the following species, *Fasciuncula*. (The scientific name is *Miana strigilis*.)

Obs. Four of Haworth's species are here included under the name of *strigilis*: the Marbled Minor (*Noctua præduncula*, *Lep. Brit.*, No. 145), represented in the upper figure; the Minor Beauty (*Noctua strigilis*, *Lep. Brit.*, No. 146); the Tawny Marbled (*Noctua latruncula*, *Lep. Brit.*, No. 147), represented in the third figure; and the Blackamoor (*Noctua Æthiops*, *Lep. Brit.*, No. 148), represented in the last figure.



509. The Middle-barred Minor (*Miana fasciuncula*).

509. THE MIDDLE-BARRED MINOR.—The palpi are porrected and curved upwards; the antennæ are rather stout in the male, slender in the female; the colour of the fore wing is reddish-brown, with a darker central band, in which are situated the paler discoidal spots: the hind wings are dark smoky-brown; the body is slightly crested.

The MOTH appears on the wing in June, flying over the standing grass: it occurs in all our counties from the North of Scotland to the Land's End, but is not very abundant. (The scientific name is *Miana fasciuncula*.)

Obs. I have followed Haworth and Doubleday in treating this as a distinct species: Guenée makes it a variety of *Strigilis*, from which it differs principally in the red tinge which pervades the wings and in the smaller size: the CATERPILLAR and economy are unknown.



510. The Rosy Minor (*Miana literosa*).

510. THE ROSY MINOR.—The palpi are curved, porrected, and slightly ascending; the antennæ are very slender in both sexes: the fore wings are gray-brown and suffused with a beautiful tinge of vinous-red; the wing is almost equally divided in two areas by a straight whitish transverse line; the area within this divisional line is darker than the area without, which has a pearly-gray tinge, shading, however, into the vinous-red towards the hind margin; in the pearly-gray space is situated the reniform, in the darker or basal area is situated the orbicular: the hind wings are pearly gray-brown: the thorax is slightly crested, the front pearly gray, transversely traversed by a black line; the square disk of the thorax is vinous-red; the body is pearly-gray.

The MOTH appears on the wing in June and July, and occurs in most of our English counties, but is particularly abundant in Devonshire, Cornwall, and the South Western Counties. (The scientific name is *Miana literosa*.)

Obs. This species is the *Erraticula* of Hubner, the *Suffuruncula* of Treitschke, the *Literosa* of Haworth, and the *Latruncula* of Fryer. Guenée adopts the first of these names; Doubleday, whom I follow, the third.



511. The Cloaked Minor (*Miana furuncula*).

511. THE CLOAKED MINOR.—The palpi are pointed, porrected, and slightly ascending; the antennæ are very slender in both sexes; the wings are nearly equally divided into a dark basal and pale outer area, the division between these areas being marked by a straight whitish line; the dark area includes the orbicular, the pale area the reniform spot; the hind margin has a dark band bordered towards the middle of the wing by a sinuous outline: the hind wings are pale gray-brown, and somewhat iridescent.

The MOTH appears on the wing in July, and is abundant in our English, Irish, and Scotch counties. (The scientific name is *Miana furuncula.*)

Obs. There are three very distinct varieties comprehended, and I believe very correctly so, under one specific name; the first represented by the upper figure, is the Cloaked Minor (*Noctua humeralis*), of Haworth (*Lep. Brit.*, No. 149); the second, represented by the middle figure, is the Flounced Minor (*Noctua terminalis*), of Haworth (*Lep. Brit.*, No. 150); and the third, represented by the lower figure, is the Plain Red Minor (*Noctua rufuncula*), of Haworth (*Lep. Brit.*, No. 152); of this last Mr. Birchall writes:—"The variety *Rufuncula*, of Haworth, occurs commonly at Howth. The wings are uniformly clay-coloured, without lines or spots, and the insect has a strong resemblance to *Nonagria concolor.*" I am indebted to Mr. Birchall for specimens. The name of *Furuncula* in the Vienna Catalogue has the priority.



512. The Least Minor (*Photedes captiuncula*).

512. THE LEAST MINOR.—The palpi are porrected, pointed, and generally rather widely separated; the antennæ are slender in both sexes: the fore wings are rather ample for so small an insect, and rather pointed at the tip; their colour is dull bistre-brown, with a somewhat darker median band, which is sometimes bounded exteriorly by a sinuous white line; the discoidal spots can scarcely be traced: in some specimens the colouring is much broken up and more variegated, and then a second transverse and sinuous white line, and the two discoidal spots are perceptible: the hind wings are smoky-gray, with pale fringes: the head, thorax, and body are umber-brown, and remarkably slender.

The MOTH appears on the wing in July, and I believe has only been taken in one locality in England, the neighbourhood of Darlington; Mr. Birchall informs us that it is common near Galway, and that the Irish specimens are smaller and much more brightly coloured than English ones. (The scientific name is *Photedes captiuncula.*)

Obs. This insect is the *Miana captiuncula* of continental authors; Herrich-Schæffer's figures 173 and 174 resemble the Irish, rather than the English, specimens, but are more variegated than any I possess. Haworth was unacquainted with the insect.



513. Haworth's Minor (*Celæna Haworthii*).

513. HAWORTH'S MINOR.—The palpi are porrected and somewhat ascending; the antennæ are slightly ciliated in the male, simple in the female: the fore wings are straight on the costa, and blunt but not rounded at the tip; their colour is bright rich umber-brown, often with a reddish tinge, and always having an oblique paler bar extending from the tip to the inner margin, and also a hind-marginal compound paler bar, which includes a series of crescentic marginal black spots; the orbicular spot is small, often inconspicuous, and sometimes wanting; it is variously formed, but generally appears as a small circular white mark; the reniform is very conspicuous, often brilliantly white; a conspicuously white wing-ray proceeds from the middle of the base of the wing, and unites with the lower extremity of the reniform, where it branches, the two branches, still white, extending almost to the hind margin; the fringe is spotted alternately light and dark brown: the hind wings are dark smoky-brown, with the base and fringe paler: the thorax is densely clothed with longish scales of a rich red-brown colour; the body is smoky-brown, and without dorsal crests, but tufted at the extremity in the male.

The CATERPILLAR, according to Mr. Stainton, feeds on the cotton grass (*Eriophorum*), but I do not find that it has been seen, much less described.

The MOTH appears on the wing in July, and continues flying over the peaty heaths during August; it has been taken in Hampshire, Sussex, Cambridgeshire, Cheshire, Lancashire, Yorkshire, Durham, and in several Scotch localities, and Mr. Birchall says it is common on the Dublin and Wicklow mountains, (The scientific name is *Celæna Haworthii*.)



514. The Treble Lines (*Grammesia trilinea*).

514. THE TREBLE LINES.—The palpi are short, inconspicuous, and almost straight; the antennæ are rather long, slightly pectinated in the males, pubescent in the females: the fore wings are ample, and rather pointed at the tip; their colour is dingy-gray, in some specimens inclining to ochreous, in others to smoky; both the discoidal spots are wanting, but there are usually four slender transverse lines, darker than the ground colour; the first of these is very short, abbreviated, and near the base of the wing; the second is almost direct, and situated at a third of the distance between the base and tip; the third, generally the broadest, but sometimes absent, crosses the middle of the wing somewhat obliquely; and the fourth is rather curved, and parallel with the hind margin: the hind wings are gray-brown, almost invariably darker than the fore wings, the hind margin is sinuous, and their fringe paler: the thorax is woolly, and always takes the tint of the fore wings,

whatever that may be; the body has the same tint as the hind wings.

The Rev. John Hellins has described the CATERPILLAR of this moth as short and thick in form, and very wrinkled He says:—"The head is small and retracted, the thirteenth segment also very small, the segmental folds deeply cut, ground colour variable; sometimes dark gray; then the dorsal line is pale gray, edged with black at the segmental folds. The subdorsal line is a series of pale gray wedges on the several segments, the thin end of each wedge pointing forwards, and its upper side bordered by a short oblique black stripe, and its bigger end inclosing a black dot: below again comes a rather broad dark-brown stripe, and below that a narrow one of gray; spiracles black, each placed on a little swelling; belly pale gray. Sometimes the ground colour is a dirty reddish-brown, with the dorsal line partaking of the same tint, but paler, edged with black, as before, most distinctly at the folds; the subdorsal row of stripes of the same colour as the dorsal line, but of uniform width, and showing distinctly only on the anterior part of each segment, where also appear a pair of black dots; the spiracular brown stripe tinged with ochreous. There is another variety of dirty flesh-colour, with the markings but faintly visible."

The MOTH appears on the wing in June: it has been taken in all our southern and midland counties, and occasionally in the northern also, extending as far north as Kirkcudbrightshire; and Mr. Birchall says it is common in most parts of Ireland. (The scientific name is *Grammesia trilinea*.)

Obs. 1. I always take the descriptions of Mr. Hellins or Mr. Buckler, when these gentlemen have published them, in preference to my own unpublished descriptions; *first*, because they are generally so excellent, and, *secondly*, as a just tribute of thanks to entomologists who, by publishing these descriptions in the *Entomologists' Monthly Magazine*, have saved me infinite labour, and thus laid me under an obligation I can never otherwise repay or acknowledge. In the present instance, I would, however, venture to suggest that Mr. Hellins has hardly given an exact idea of the form of this caterpillar, which I should rather describe as somewhat onisciform, the extremities narrowed, the middle of the body broad, and the belly flattened. The colour of the head is testaceous, and the front of the second segment of the same colour, or even more inclining to red. It feeds on the great plaintain (*Plantago major*).

Obs. 2. Four supposed species are here included under the name *Trilinea*. First, the Equal Treble-lines (*Noctua trilinea*) of Haworth (*Lep. Brit.*, No. 262), represented in the upper figure; second, the Inequal Treble-lines (*Noctua approximans*) of Haworth (*Lep. Brit.*, No. 263), represented in the second figure; third, the Clouded Treble-lines (*Noctua semifusca*) of Haworth (*Lep. Brit.*, No. 264), represented in the third figure; and, fourth, the Dark Treble-lines (*Noctua bilinea*) of Haworth (*Lep. Brit.*, No. 265), represented in the lowest figure.



515. The Marsh Moth (*Hydrilla palustris*), female.

515. THE MARSH MOTH.—"The palpi are slender and straight or bent downwards, and so densely clothed with long scales, which add greatly to their apparent size, as entirely to conceal the apical joint: the antennæ are short and moniliform: the fore wings of the male are oblong, and rounded at the tip, they are of a violet gray-brown colour, with the two discoidal spots, and two approximate and parallel transverse lines (the elbowed and the subterminal) darker, but all the markings are very obscure, and composed of dark scales: the hind wings are silky and whitish-gray, with the wing-rays and a line (trait) occupying the whole cellule darker. The female is much smaller than the male, and has the fore wings narrower and darker-coloured, and the markings less distinct; the hind wings are also darker and narrower.

"The CATERPILLAR is fusiform, and of a brown colour, with darker chevroned markings, terminating in black points; the mediodorsal stripe is white, and interrupted with two large white dots on each side: the head and spiracles are black. It feeds, in July and August, on plantain (*Plantago*) and other low plants: the CHRYSALIS is subterranean.

"The MOTH appears on the wing in May and July." A single specimen is said to have been taken in Cambridgeshire, and another "at Compton's wood, near York, flying over grass in a damp place." (The scientific name is *Hydrilla palustris*.)

Obs. My description is copied from Guenée. I do not possess the insect. The figure is from a female specimen in the British Museum.



516. The Reddish Buff (*Acosmetia caliginosa*).

516. THE REDDISH BUFF.—The palpi are porrected and curved; their joints very distinct, the second joint is scaly, and the terminal joint filiform and naked; the antennæ are short and pubescent in the male, slender, and furnished with scattered hairs in the female: the fore wings are very ample, and square at the tip, the hind margin is slightly waved; the colour is gray-brown, with three interrupted and indistinct transverse lines; between the first and second of which is an indistinct cloudy spot, probably representing the reniform; between the second and third transverse lines there is a transverse series of nine black dots, always indistinct, and sometimes scarcely to be traced: the hind wings are very ample, with a waved margin; their colour is gray, powdered with gray-brown scales: the head, thorax, and body are gray-brown; the body is remarkably slender.

The MOTH appears on the wing in June. My specimens were taken by the late Charles Turner, in Hampshire, flying by day; they are in a very imperfect condition. (The scientific name is *Acosmetia caliginosa*.)

Obs. 1. In this species, as in the preceding, the females are smaller than the males.

Obs. 2. This is the Reddish Buff (*Noctua lutescens*) of Haworth (*Lep. Brit.*, No. 15); Mr. Stephens seems to have made some mistake (*Haustell.* iii. 122) in giving *Caliginosa* and *Lutescens* as distinct species (a mistake which is not entirely rectified in the Museum Catalogue, where the name *Lutescens* is still retained as a variety). Mr. Stainton very properly drops this fictitious species altogether.



517. The Mottled Rustic (*Caradrina Morpheus*).

517. THE MOTTLED RUSTIC.—The palpi are slightly porrected, slightly curved upwards, and rather distant; the antennæ are almost simple in the male, quite so in the female: the fore wings are rather square at the tip and straight on the costa; their colour is dingy gray-brown, with the discoidal spots and several transverse linear markings darker brown; there is also a distinct bar of the same darker colour, parallel with the hind margin: the hind wings are whitish-gray, with a darker shade at the tip, and a marginal series of linear spots, which often form an almost continuous line; the wing-rays and discoidal spots are also darker: the head and thorax have the darker colour of the fore wings, the body the paler colour of the hind wings.

The EGGS are laid in July and August on docks and other low plants, and the young CATERPILLARS, hatched in about a fortnight, feed on the leaves and continue feeding throughout the autumn and winter, and until the following May, when they are full grown; they are throughout their lives excessively

sluggish, concealing themselves on the underside of leaves close to the ground, or even under the surface of the earth, coming out to eat when they find the temperature agreeable. The head is rather narrower than the second segment, the body stout and full; its colour is gray-brown with a series of darker wedge-shaped markings on each side, and a pale stripe in the region of the spiracles: there are short bristles or hairs scattered over every part of the body: it makes a cell rather than a cocoon just under the surface of the earth in May, and therein changes to a CHRYSALIS.

The MOTH appears on the wing in June, July, and August, and is common in most parts of England. Mr. Douglas Robinson reports it from Scotland, but Mr. Birchall did not meet with it in Ireland. (The scientific name is *Caradrina Morpheus.*)



518. The Uncertain (*Caradrina Alsines*).

518. THE UNCERTAIN.—The palpi are slightly porrected, curved upwards, and very distant; the antennæ are almost simple in the male, quite so in the female: the fore wings are very straight on the costa, and blunt at the tip; their colour is pale dingy-brown tinged with ochreous; the discoidal spots are darker than the ground colour, very distinct, and very regularly and distinctly outlined with pale brown; two transverse zigzag lines cross the wing, the first before the orbicular, the second beyond the reniform; between these two is a transverse median darker shade or obscure band; parallel with the hind margin is a pale whitish line with a dark brown interior border: the hind wings are pale gray-brown tinged with ochreous; the head and thorax are ochreous gray-brown, the body paler.

Mr. Harpur Crewe has given a very careful description of the CATERPILLAR in the *Zoologist* for August, 1861; it is as follows:—"Before last moult: back and sub-dorsal parts dusky purplish-brown; sides and belly yellowish-gray; central dorsal line whitish; sub-dorsal line edged with black; central line bordered on either side of each segment by a large black tubercular spot; spiracular line waved, blackish; between sub-dorsal and spiracular lines a row of blackish tubercular spots, smaller than the dorsal ones. Both dorsal and lateral tubercles surmounted by a longish white hair; head dusky yellowish-brown; belly mottled on the sides with dusky markings. After last moult: ground colour pale reddish-drab or buff; back more or less tinged with purplish-brown; medio-dorsal line whitish, bordered with black at the centre of each segmental division; tubercular spots as before; sub-dorsal lines yellowish-white, edged, on the upper side narrowly, and on the lower side broadly, with black, and dotted on the former, on each segment, with a yellow tubercle having a black centre; spiracles enclosed in a dusky space between two black lines; tubercular hairs yellowish; when very young the ground colour is a uniform pale yellowish-gray; central dorsal and sub-dorsal lines white, the latter indistinct; spiracular line blackish; dorsal and lateral tubercles very small and indistinct. The caterpillars from which the foregoing description was taken, were reared from eggs laid by moths taken by myself in August; they were hatched in about six weeks, and fed throughout the autumn and winter on chickweed (*Alsine media*). They were full-fed in March; CHRYSALIS bright red, short and stout, enclosed in a tightly spun earthen cocoon."

The MOTH appears on the wing in July; it has been taken in our southern and midland counties, and even as far north as the Mersey, but I think has not been reported from Scotland or Ireland. (The scientific name is *Caradrina Alsines.*)



519. The Rustic (*Caradrina blanda*).

519. THE RUSTIC.—The palpi are slightly porrected, curved upwards, and distant; the antennæ are almost simple in the male, quite so in the female: the wings are straight on the costa and blunt at the tip; their colour is gray-brown with a slight rosy tinge, and powdered with white scales; the discoidal spots are darker than the ground colour, very distinct, and very regularly outlined with pale brown; there are two transverse lines of a darker tint, the first inside the orbicular, the second outside the reniform, and broken up into dots; between these two is a transverse median shade or obscure band; parallel with the hind margin is a pale whitish line with a dark brown interior border: the hind wings are gray-brown, and slightly iridescent; the head and thorax are of the same colour as the fore wings, the body of the same colour as the hind wings.

Mr. Harpur Crewe has given the following careful description of the CATERPILLAR in the *Zoologist* for August, 1861:—"When quite young this caterpillar is not distinguishable from that of *C. Alsines*, but after a few moults they may be separated with the greatest ease. Before last moult: ground colour, reddish-gray, or buff. Down the centre of the back a series of fig or mushroom-shaped dusky blotches, intersected by a whitish central line edged with black on the lower side; space between sub-dorsal lines and spiracles dusky; spiracles and spiracular line black, the lower edge of the latter buff; dorsal, sub-dorsal, and spiracular lines studded with very small scarcely perceptible tubercles, each surmounted by a whitish hair; head buff; belly destitute of markings. After last moult: ground colour, yellowish buff, or drab; back slightly marbled with black; central dorsal line yellowish, edged with black, and entirely black at the centre of each segmental division; sub-dorsal lines very slender and faint, black or dusky-brown; immediately below the latter a broad, distinct, dusky line; spiracular line blackish; spiracles black, in a white ring; space between sub-dorsal and spiracular lines dusky; belly greenish-yellow; tubercles and tubercular hairs as before. These caterpillars were hatched in September from eggs laid in August, and fed all through the winter on chickweed (*Alsine media*), being full-fed in April. CHRYSALIS bright red, similar to that of *C. Alsines*, enclosed in a tightly spun earthen cocoon."

The MOTH appears on the wing in June and July, and is not uncommon in our English counties, and extends northwards even into Scotland. Mr. Birchall informs us it is common in most parts of Ireland. (The scientific name is *Caradrina blanda*.)

Obs.—Few entomologists distinguish accurately between this and the preceding, and, therefore, the published localities for the two species are not trustworthy: they are exceedingly similar, the principal distinction being in the tint of colour, *Alsines* having a tendency to ochreous, *blanda* to obscure purple and rosy: nevertheless, there can be no doubt as to their distinctness, the caterpillars being so different.



520. The Pale Mottled Willow (*Caradrina cubicularis*).

520. THE PALE MOTTLED WILLOW.—The palpi are porrected, slightly ascending, and rather distant; the antennæ are simple in both sexes; the fore wings are straight on the costa, and blunt at the tip; their colour is that of putty, sometimes slightly approaching to

ochreous; the orbicular is very small and circular, the reniform is elongate; both are distinct; the costa is pale, with four conspicuous and equidistant black spots, the last of which is over the reniform; there are several dark transverse lines, all of them interrupted and indistinct, and there is a dark bar on the hind margin: the hind wings are white, with pale brown wing-rays and hind margin; the head, thorax, and body are of the same colour as the fore wings.

The CATERPILLAR has a shining head, rather narrower than the second segment, into which it can be partially withdrawn; the body is short and stout, slightly narrower towards the extremities, and having a few hairs scattered over all parts of the body, and each emanating from a minute wart; the colour of the head is black; there is a broad dorsal area of an obscure greenish-gray colour, with a broad lateral area smoky-gray: the ventral area is paler, and the claspers are concolorous with the ventral area. The EGGS seem to be laid on various kinds of farinaceous and leguminous crops, on which the young caterpillar feeds, and, being very small at the time of harvest, gets housed with the corn and pulse, and then forms a little *cubiculum* among the stalks of the corn in which to reside throughout the winter, changing to a CHRYSALIS in May: in wheat ricks they sometimes swarm to a fearful extent, doing great injury; but I was not aware that they attacked also the field-peas, until I read the following passage from the pen of Mr. Buckler, in the ninth number of the *Entomologists' Monthly Magazine*:—"During the past summer, some field-peas grown in this neighbourhood were observed by the owner and his men to be very much blighted, and constantly visited by flocks of starlings, especially just before they were harvested: when the peas were taken into the barn, on the 12th of December, to be threshed, an immense number of the caterpillars of *Caradrina cubicularis*, from half to full-grown, were dislodged from the haulm. Having previously only known this species to infest wheat-stacks, and seeing these caterpillars to be rather greener than usual, I resolved to rear some of them, in the hope of obtaining some varieties of the moths; and, accordingly, secured eighty specimens, most of which are nearly full-grown, and inhabit cocoons, formed of their food, and fragments of peas and earth spun together."

The MOTH appears on the wing about midsummer, or rather earlier, and is common throughout England, Scotland, and Ireland. (The scientific name is *Caradrina cubicularis*, a name which the authors of the "Accentuated List" attribute to its "belonging to a bedchamber; occurring in out-houses." Is it not more probable that the observant authors of the "Vienna Catalogue" imposed this most appropriate name in allusion to the familiar habit of the caterpillar residing in a little *cubiculum* or lodging-room of its own construction?)



521. The Brown Rustic (*Rusina tenebrosa*).

521. THE BROWN RUSTIC.—The palpi are flattened, porrected, and ascending; the antennæ are pectinated in the male, simple, but rather stout in the female: the fore wings are rather ample, and square at the tip, their colour is rich lustrous-brown, with two transverse zigzag black lines, between which is a transverse darker shade; outside of this shade the reniform is perceptible, but rather indistinct; it is slightly paler than the rest of the wing; the orbicular is scarcely to be traced; on the costa are five pale spots, the first and second larger and more distinct than the other three which are near the tip: the hind wings are smoky-brown, ample, and with a sinuous outline: the head and thorax are umber-brown; the body smoky-brown.

The head of the CATERPILLAR is narrower than the second segment, and susceptible of being partially withdrawn thereinto; it is very glabrous, with a few scattered bristles: the body is nearly cylindrical, very gradually attenuated towards the anterior margin of the twelfth segment, thence suddenly sloping to the anal extremity; it has a manifest lateral skinfold, and a velvety surface. The colour of the head is dark brown; the antennal papillæ pale at the base; the body is rich umber-brown, with a very narrow pale medio-dorsal stripe on the second, third, and fourth segments; also a series of pale subdorsal markings on each side, and each of these is bounded below by a darker oblique mark; the lateral skinfold is paler; the ventral surface, legs, and claspers are reddish-brown. It feeds on several low plants which preserve their green leaves throughout the winter, more especially on the species of violet (*Viola*); it continues to feed during the winter; in confinement it will eat the common knot-grass (*Polygonum aviculare*). When full-fed it retires just below, or on the surface of the earth, and there spins a silken cocoon, attaching particles of earth to the exterior, and in this it changes to a short dumpy CHRYSALIS, resembling those of the *Cuspidates*.

The MOTH appears on the wing in June, and occurs in some abundance in most of our English counties, and also in Scotland, and Mr. Birchall informs us it is common in most places in Ireland. (The scientific name is *Rusina tenebrosa*.)

Obs.—The male is the Feathered Rustic (*Bombyx phæus*) of Haworth (*Lep. Brit.*, No. 94), and the female the Brown Rustic (*Noctua obsoletissima*) of Haworth (*Lep. Brit.*, No. 129).



522. The Archer's Dart (*Agrotis valligera*).



522. The Archer's Dart (*Agrotis valligera*).

522. THE ARCHER'S DART.—The antennæ of the male are decidedly ciliated, those of the female simple: the fore wings have the costal margin straight, the tip rather blunt, but not rounded; their ground colour is pale bistre-brown, varied with dark bistre-brown markings; the orbicular spot is small, compressed, and ocellated, its figure elongate-oval, its colour very pale, and it almost invariably has a dark brown dot in the centre; it is usually placed in a dark brown wedge-shaped mark, the point of which is directed towards the base of the wing, while its own base rests on the reniform spot, which is large and conspicuous, with a dark centre, pale circumscription, and very dark surroundings; near the base of the wing is a third oval spot, with very pale circumscription and light brown centre, and on this rests a very dark and distinct oblong spot called the claviform: the costal margin has three rather conspicuous pale narrow spots, the third opposite the

reniform, and beyond the third, that is nearer the tip, are three pale dots: the hind margin is dark brown, bounded, towards the disk of the wing, by a pale zigzag line, on which rest six or seven wedge-shaped spots, their points being directed towards the base of the wing; the fringe is pale on the inside, dark on the outside: the fore wings of the female are usually darker than those of the male, and less distinctly variegated: the hind wings are very pale in the male, smoky-brown in the female; they have a crescentic discoidal spot, a darker but indistinct marginal band, darker rays, and a pale fringe: the thorax is variegated with the two tints of brown, which adorn the fore wings; the body is pale gray at the base, pale brown at the tip.

"The CATERPILLAR is dull greenish-gray, with paler dorsal and darker sub-dorsal stripes; two rows of black dots between them, and a row of short white streaks on each side of the spiracles (*Freyer*). It feeds at the roots of grasses."—*Stainton's Manual*, vol. i. p. 223.

The MOTH appears on the wing in July, and seems rather a coast than an inland species: it has been taken rather plentifully in the localities where it occurs, as at Penzance, Whitsand Bay, Slapton Ley, Budleigh-Salterton, Torquay, Braunton-Burrows, Poole, Isle of Wight, Brighton; Essex, Norfolk, and Suffolk coasts, coasts of Pembroke, Caermarthen, Glamorgan, Cardigan, Flint, Cheshire, and Yorkshire: it also occurs in Scotland, and Mr. Birchall says it is abundant on the coast of Ireland. (The scientific name is *Agrotis valligera*.)

Obs.—In our *British Lepidoptera* many of those groups of individuals now regarded as "species" are excessively variable in the tint of colour, and in the character of the markings: this is more particularly the case in the genus *Agrotis*, and my illustrious predecessor Haworth, who has been justly styled the Father of British Lepidopterology, founded numerous species on these very obvious differences. Much as I value the labours of Haworth, and greatly as I treasure his "Lepidoptera Britannica," I need hardly say that I entirely agree with those later observers who have regarded such differences as of less importance than specific rank; and who have found, by breeding from the egg, that progeny the most diversified, in these particulars, often claim a common parentage; and, therefore, that it is each group of such diversely ornamented individuals, and not each form of variation, that is entitled to rank as a "species:" all the descendants of one parent or one pair of parents thus constitute a "species." This principle was always admitted, but it is only of later years that the wide extent of variation in a species has been thoroughly appreciated and understood. It has therefore become desirable under each of our modern species of these variable moths, to associate the names given by Haworth, whether under the impression that they were species, or from any reason previously undescribed. The present species is the Archer's Dart (*Bombyx sagittiferus*) of Haworth (*Lep. Brit.*, No. 66).



523. The Shuttle-shaped Dart (*Agrotis puta*).

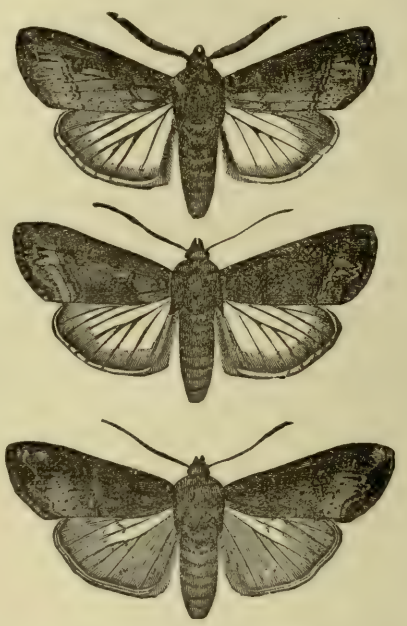
523. THE SHUTTLE-SHAPED DART.—The antennæ are very slightly ciliated in the male, simple in the female; the fore wings are nearly straight on the costa, and rather blunt at the tip; their colour in the male is wainscot-brown with a dark brown shade at the base, and another surrounding and incorporating the concolorous reniform spot; in the female they are dark bistre-brown with a medium pale shade, which includes the orbicular spot, reduced to a short dark brown line bordered with pale brown: the hind wings are white in the male, pale smoky-brown in the female; the head is pale gray, the front of the collar dark brown, the rest of the

thorax pale gray; the body is pale dingy-brown.

Mr. Buckler has described the CATERPILLAR in the *Entomologists' Monthly Magazine* for February, 1868. Some EGGS, obtained by Mr. Hellins, hatched on the 2nd of September, 1867, and the young caterpillars were placed in a large pot with a quantity of sea sand, and growing plants of dandelion and knot-grass, leaves of lettuce and slices of carrot being provided as food: the lettuce appeared to be preferred. Most of the caterpillars obtained their full growth about the end of the year. The head is then small, the body plump and cylindrical, with a semicircular inflation in the region of each spiracle; the segmental divisions deeply cut; the legs and claspers small in proportion. The colour of the back is at first dark ochreous-brown, but changes gradually with its growth to brownish-ochreous or dull ochreous; this tint is bounded on either side by the dark brown edge of the sub-dorsal line; there is a delicate mottling of rather darker brown of a pear-shape on each segment, its broad end in front, through which runs the dorsal line, which is of the brown colour (pale when the caterpillar is quite full-grown), and is very thin at the beginning, but expands almost into an elongated diamond form at the end of each segment, and is distinctly edged with darker brown, particularly at its widest part. The sub-dorsal line is dark brown, having close beneath it a mere thread of very pale greenish-gray; and from this to the spiracles, the sides are grayish-brown; another pale thread, much interrupted, running a little above the spiracles. Below the spiracles is a very faint trace of a double dirty whitish line; all the rest of the lower and under surface being a pale greenish-gray tint and semi-translucent. The head is brown, the lobes and mouth marked with darker brown, and very glabrous. There is a dark brown plate on the second segment, having three pale longitudinal lines. The spiracles are black, and the tubercular warty dots very dark brown, each furnished with a very minute short hair.

The MOTH appears on the wing in August, and is by no means abundant: the only specimens I have ever taken were in my own garden at Peckham; indeed, it seems generally distributed round the metropolis. It occurs at Brighton, Lewes, Dover, Cambridge, Bristol, &c., but not frequently in the north. I do not recollect having seen it reported from Scotland or Ireland. (The scientific name is *Agrotis puta*.)

Obs.—This is the Shuttle-shaped Dart (*Bombyx radius*) of Haworth (*Lep. Brit.*, No. 67), who described it as a novelty, but it is now universally admitted to be the *Noctua puta* of Hübner.



524. The Dark Sword-grass (*Agrotis suffusa*).

524. THE DARK SWORD-GRASS.—The antennæ are slightly ciliated in the male, simple in the female: the fore wings have the costal margin nearly straight, and the tip blunt; the colour in the male is pale umber-brown, with a dark umber-brown shade along the costal and hind margins; in the females the dark costal shade extends to the inner margin, and occupies two-thirds of the wing; there is a clearly-defined dark brown linear mark resting on the

outer edge of the reniform spot, and pointing to the hind margin; but between this dark mark and the hind margin there are two acutely wedge-shaped spots pointing towards the middle of the wing: the hind wings are delicate pearly-gray, glossed with pink reflections, and having darker wing-rays, more especially towards the hind margin, which is also clouded with brown; the head and thorax are umber-brown, the body rather paler.

Some EGGS of this moth, procured from a female captured on sallow blossoms on the 24th March, were laid on 7th of April, and were hatched on the 30th of the same month. The CATERPILLARS appear to lead a subterranean life, invariably remaining buried in the earth during the hours of daylight, and only coming out to feed by night. The head is smaller than the second segment, and very glabrous; the body is cylindrical, and having the warts common in these subterranean caterpillars very small and inconspicuous, and each emits a short and very fine bristle: there is a glabrous plate on the second segment. The colour of the head is pale semi-transparent brown, mottled with darker brown; of the body, dull lead-colour, slightly metallic, and somewhat shining; there is a very narrow medio-dorsal stripe rather paler, and two stripes on each side rather darker than the ground colour, and all of these are rendered more visible from having darker borders; but all these markings are extremely indistinct. It feeds on the roots and leaves of endive, spinach, sea-kale, lettuce, radishes, and probably other cultivated vegetables. When full-fed it forms an oval cell in the earth, polishing the inside with care, and in this changes to a red-brown CHRYSALIS with a sharp spine-like caudal extremity.—See No. 47 of the *Entomologists' Monthly Magazine.*

The MOTH appears on the wing in September, and occurs in most of our English counties; it is reported by Mr. Douglas Robinson from Scotland, and by Mr. Birchall from Ireland. (The scientific name is *Agrotis suffusa.*)

Obs.—This is the Small Sword-grass (*Bombyx spiniferus*) of Haworth (*Lep. Brit.*, No. 51), and *Noctua spinifera* (*Lep. Brit.*, No. 154), and also the Dark Sword-grass (*Noctua suffusa*, *Lep. Brit.*, No. 155).



525. The Pearly Underwing (*Agrotis saucia*).

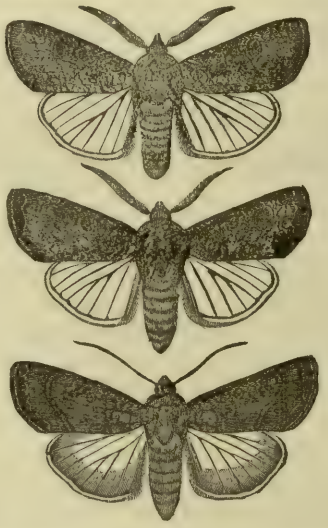
525. THE PEARLY UNDERWING.—The antennæ are very slightly ciliated in the male, making them appear stouter than those of the female; the fore wings are straight on the costa, blunt at the tip, and slightly waved on the hind margin; their colour is generally dull-brown, with a strong tendency to become vinous-red on the costa and sometimes this colour pervades the whole of the wing; but these shades are very inconstant—indeed, the distribution and tint of ground colour seems very capricious; in some specimens the costal area is almost black, as in the second figure, in others it is pale wainscot-brown, as in the third figure; both the discoidal spots are to

be traced, but are not very conspicuous; the reniform has usually a dark central area with a few very pale scales on its outer edge; the costal margin of the wing is spotted, having seven black and three very small pale spots; the black markings are thus arranged: two approximate and transversely linear near the base; then two also approximate before the orbicular; then a single one opposite the orbicular; and then two opposite the reniform; between these and the tip are three very small equidistant pale spots; every part of the wing is more or less thickly marked with short transverse black lines: the hind wings are pearly-gray, clouded, especially towards the hind margin, with smoky brown, and having the principal wing-rays and a rather indistinct crescentic discoidal spot dark brown: the head and thorax are very nearly of the same colour as the fore wings, the vinous-red generally prevailing; the body is dingy gray-brown.

The CATERPILLAR is stout, and almost uniformly cylindrical: it is of a grayish-red colour, having the same tinge of colour as the moth; there is a paler but narrow mediodorsal stripe which passes through a series of dorsal lozenges of a darker brown: on each side is a lateral stripe, also of darker brown: it feeds on grass, clover, dock, plantain, and probably many other low plants, concealing itself by day, and eating only at night.

The MOTH appears in May and October, and Mr. Doubleday considers it regularly double-brooded; Mr. Hellins records the capture of three full-fed caterpillars—one in July, the moth appearing on the 22nd of September; a second on the 2nd of August, the moth appearing on the 14th of September; and a third on the 4th of August, the moth appearing on the 5th of October. This careful observer adds, "I think we must conclude there are two broods, one on the wing in May and June, the other in August, September, and October." This species is very capricious in its appearance, some years being plentiful, others extremely scarce: it seems to be very generally distributed in England and Scotland, and Mr. Birchall informs us that it was taken at Dublin in 1865. (The scientific name is *Agrotis saucia*.)

Obs.—This is the Pearly Underwing (*Noctua margaritosa*) of Haworth (*Lep. Brit.*, No. 156), and the Dark Pearl Underwing *Noctua majuscula*) of Haworth (*Lep. Brit.*, No. 157)



526. The Turnip Moth (*Agrotis Segetum*).

526. THE TURNIP MOTH.—The antennæ are strongly ciliated in the male, simple in the female; the fore wings are nearly straight on the costa, and nearly square, but rather blunt at the tip; their colour is pale gray-brown, approaching to putty-colour in the male, dark umber-brown in the female; the discoidal spots are clearly defined in the male, less distinct in the female, their circumscription or boundary line is very dark, and the central area *rather* dark, the intervening space being pale; between the orbicular and the base of the wing a double and rather sinuous dark line crosses the wing, and outside the reniform is a second double transverse line; the costal and hind margins are spotted and varied with two shades of brown; near the hind margin, and parallel therewith, is a row of eight pale spots: these different markings are nearly always traceable, but very inconstant and various as regards their distinctness: the hind wings are pearly white, clouded in the female

towards the hind margin; the principal wing-rays are also dark; the thorax varies in colour with the fore wings, being generally pale in the males and dark in the females: the body is putty-coloured in the males, gray-brown in the females.



Caterpillars of the Turnip Moth (*Agrotis Segetum*), feeding in the interior of a Turnip

The EGG is laid in June, either on the ground or on some plant, generally a seedling, *close to the ground;* hatched in this position, the young caterpillar is enabled to attack the young turnips, carrots, cabbage-plants, charlock, mangold-wurzel, radish, and a number of the

common weeds. Having tried the CATERPILLAR with a great variety of provender, I can vouch for its feeding on any plant sufficiently succulent; but when young its depredations are mostly above the surface of the ground, and it seems to delight in that particular part of a plant which lies between root and stem, as I have found numbers of young turnips and carrotsdivided exactly at this spot, the upper part being left to perish on the surface of the ground. It also visits our flower-gardens. Very often in a bed of China Asters—that favourite flower with all old-fashioned gardeners—the leaves of a plant here and there will be found withering and curling up, and you become aware that it is dying, and can't tell why: just examine the stem where it enters the ground, and you will find it completely decorticated; the rind has been gnawed off all round, and, the circulation of sap being prevented, life is destroyed. This is the work of the caterpillar of *Agrotis Segetum:* you pull up the aster to find the enemy, but fail; his depredations were committed in the night, and before daybreak he has wandered far away, several inches, or perhaps feet, and has burrowed like a mole in the light friable earth that gardeners love. It is tedious work looking for the mischief-maker at night with a candle and lantern, and picking up every caterpillar you may chance to find; and it is destructive to dig between the plants: some gardeners sprinkle lime on the ground, others sawdust, others soot, others ashes, others salt, and others ammoniacal water from gas-works; but the result is far from certain, and, therefore, unsatisfactory. In August and September the caterpillar, which has selected a turnip or a swede for its food, goes further down: its operations are now almost entirely subterranean, and its chosen site is the very base of the turnip bulb around the tap root which descends into the earth. Here it excavates large and almost spherical cavities, in which it resides henceforward, except during severe frost, not returning to the surface unless its food fails: when full-grown it is an inch and three-quarters, or even two inches, in length, extremely stout, and its skin tight and shining: when forcibly unearthed, it rolls itself in a loose ring, but almost immediately afterwards unrolls, and, if placed on the surface of the earth, instantly buries itself with the activity and skill of a mole. The head of the full-fed caterpillar is stretched out on a plane with the body, and is much narrower than the second segment, flattened, and not notched on the crown; the body is cylindrical, the back slightly wrinkled transversely; the colour of the head is pale dingy brown, with two longitudinal patches of dark brown on the face; the labrum and antennal *papillæ* are white; the body is pale smoke-colour, sometimes slightly tinged with pink, or purplish-brown, and always striped, although sometimes very indistinctly; the second segment has on its back a dark and semicircular shining plate; and each of the other segments has ten circular, shining, dot-like spots, slightly raised above the surface of the skin, and slightly darker than the ground colour; each of these spots emits a small central bristle, and each, also, is surrounded by a paler area; on the third and fourth segments these spots form a pretty regular transverse series, but on the fifth and following segments four of them are ranged in a square or trapezoid; one spot is situated just above each spiracle, one below it, and two others on each side of each spiracle; the spiracles themselves are very small and intensely black; the ventral area is the colour of putty; the legs are pale, and the claspers putty-coloured and very small, not spreading at the ends. These caterpillars turn to smooth brown CHRYSALIDS in the ground, some in October, but the greater number not until the following May. Those which become chrysalids in October emerge as perfect moths in the course of a few days; they rarely, if ever, pass the winter in the chrysalis state, and it is a very remarkable and hitherto unexplained fact, but one which I have dwelt on at some length in a paper read before the Entomological Society, that the female moths which are disclosed in October and do not hybernate, are almost invariably barren: I say *almost*, because I do not desire to press this theory

unduly; as far as my observations have extended they are *always* barren and therefore entirely useless as regards the continuance of their kind. This is by no means an isolated case of the superabundant supply of life provided by Nature; the autumnal production of drones in bee-hives—not one in a thousand of which ever serves any useful purpose, as far as apiarians have ascertained—is a similar instance of the lavish abundance Nature supplies; and the destruction of these drones by the workers exhibits the mode in which she disposes of this superabundance. These barren moths are not merely unproductive, but their bodies are perfectly empty, mere hollow cavities without eggs or any perceptible ovary. If the winter prove severe the caterpillars retire deeper, beyond the reach of frost, returning towards the surface again as soon as the thermometer rises.

The bulk of the MOTHS emerge in June, and then the sexes are in equal numbers, and the females are invariably fertile, their bodies being filled with eggs. The species is only too common everywhere. (The scientific name is *Agrotis Segetum.*)

Obs. 1. The hybernation of caterpillars is a fact very familiar to entomologists; but they live through the winter in a quiescent state, as though slumbering, and do not eat, simply because their usual supply of food has failed; the leaves have fallen, and they are compelled to wait until spring has produced a fresh supply. But in the case of these turnip-grubs it is very different: their food, being roots, is to be found at all seasons, and the work of destruction goes on incessantly, and is only limited by the supply; indeed the various agricultural roots are often harvested with the enemy concealed in the interior.

Obs. 2. I believe I should rather understate the fact if I were to say that during the spring and summer of 1864 I received, through her Majesty's Post-office, one hundred consignments of this most injurious insect, together with details of its ravages, and demands for a remedy. It is taken for granted, from my long course of observation, and frequent communications to public papers on the subject of insect pests, that I possess a sort of omniscience in these matters, whereas, the truth is, however we may seek to disguise it, that the most learned and most observant of entomologists knows but little, very, very little; and when he ventures on advice, instead of being couched in the cabalistic figures of a prescription, or a recommendation to purchase some nostrum of which he, the entomologist, may be supposed the proprietor, is generally a simple recommendation to the querist to allow Nature to take her course. Thus, all my own observations tend to show that Nature is her own physician, and that neither allopaths nor homœopaths can do anything better or wiser than allow Nature to work out her own cure. In our own bodies we find that almost every disease can be traced, more or less directly, to some interference with the course of Nature: we eat too much, or drink too much, or interfere in some way with Nature's laws; inconvenience follows, and we demand a second interference to balance the first. It is exactly thus with the world of animals. Birds, insects, all living things, have their appointed food: this is a law with which it is dangerous to interfere: the present instance is as good an illustration of this as can possibly be given. Nature supplies roots as the food for the turnip-grub. Man increases the supply of food prodigiously; Nature increases the number of devourers prodigiously. The farmer does everything in his power, and very properly so, to increase the crop of swedes, turnips, mangold-wurzel, potatoes, and so forth; Nature does all in her power to increase the number of the grubs so abundantly supplied with food; these grubs are the especial and favourite food of certain birds—the partridge, the rook, the starling. Following up the invariable law, Nature multiplies the birds because of this superabundant supply of grubs; man thwarts Nature, destroys the birds, and gives immunity to the grubs. Thus we allow the grubs to increase—in fact, give them every encouragement; they revel in the abundance we have provided for them, and we wonder at their voracity, and demand a remedy for the injury we have caused. This principle of

interference is carried on by man in very many other instances, in a manner highly detrimental to his own interest: he pays the price of a sack of grain for every owl nailed to his barn-door, because that owl would destroy mice every night; and these mice being relieved of their oppressive enemy would, in a very short time, consume a sack of wheat, peas, or beans. The kestrel, in like manner, kills mice, and the death of a kestrel may fairly be reckoned a loss of five pounds. A sparrow-hawk left to himself, even by scaring the sparrows from the ripening grain, will save the wages of at least three boys. In Scotland the incessant warfare against birds of prey, and the near accomplishment of their extermination, has allowed such an increase of the ring-dove as to threaten, by their insatiable voracity, a dearth of cereals for the food of man. Associations are formed, officers appointed, speeches made, rewards offered: the object being solely and exclusively to remedy the evil which the speech-makers have, by their supposed sagacity, induced. Fifty such instances might be given, but let us take the particular instance of the turnip-grub. Two birds make it their special and favourite food; these are the partridge and the rook: it is very interesting to watch with a pocket-glass the instantaneous movement with which they seize on the caterpillar directly they have brought him to the surface, the rook delving for him with its beak,—a habit that might have obtained for this invaluable bird the name of *fodiens* rather than *frugilegus*, —and the partridge turning him out by the simple expedient of scratching, after the method practised by all birds of the poultry order. Neither of these birds is favoured with a place in that "gamekeeper's museum," the bole of an oak or the door of a barn; but, nevertheless, they are persecuted for sport, or destroyed by poison, and, whatever the pretext for the slaughter, the effect is the same. Partridges and rooks alike grace our tables—partridges under their own name, rooks, *nomine mutato*, as the chief ingredient of pigeon pies.

Obs. 3. The first author who noticed the ravages of this caterpillar was "Rusticus," of Godalming, in 1832; the second, Mr. Le Keux in the "Transactions of the Entomological Society," in 1840; and the third, Mr. Curtis, in his "Farm Insects," in 1860.

Obs. 4. This is the Brindled Heart and Club (*Bombyx catenata*) of Haworth (*Lep. Brit.*, No 54), and also the Pectinated Dart (*Bombyx pectinatus, Lep. Brit.*, No 55); the Necklace Dart (*Bombyx monileus, Lep. Brit.*, No. 56); the Brindled Dart (*Bombyx spinulus, Lep. Brit.*, No. 57); the Dark Dart (*Bombyx subatratus, Lep. Brit.*, No. 61); and the Black Dart (*Bombyx nigricornutus, Lep. Brit.*, No. 62); all these are subsequently placed in the genus *Noctua* at p. 218-9 of the same work.



527. Eversman's Rustic (*Agrotis fennica.*)

527. Eversman's Rustic.—The palpi are rather porrected, and slightly arched, the apical joint sparingly clothed with scales, and very distinct; the antennæ are simple in both sexes, those of the males are slightly incrassated: the fore wings are very narrow, their colour is dingy bistre-brown, with the inner margin ochreous; the ochreous area, extending from the base to the third double transverse line, is rather broad, reaching nearly to the discoidal spots; there are three very distinct double transverse lines, or rather pairs of lines; the first short, and very near the base of the wing; the second just before the orbicular; the third just beyond the reniform; the fourth is parallel with the hind margin, and emits a number of wedge-shaped markings, pointing towards the base of the wing; the discoidal spots are very distinct and conspicuous; the orbicular is rather small, oblique, and oblong; its circumscription is ochreous-white, its median area dark brown; the reniform is large, its circumscription ochreous-white, its median

area blackish at both extremities, more particularly the lower : the hind wings are very ample, their colour is pale gray-brown at the base, darker brown towards the hind margin; there is a crescentic discoidal spot, which with the wing-rays is also darker : the head and thorax are of the same colour as the fore wings ; the body as the hind wings.

The MOTH appears on the wing in July and August ; it has occurred on the Continent of Europe, and also in the State of New York ; and Mr. Stainton says, "One specimen has occurred in Derbyshire." (The scientific name is *Agrotis fennica.*)



528. The Crescent Dart (*Agrotis lunigera*).

528. THE CRESCENT DART.—The antennæ are ciliated in the male, simple in the female: the fore wings are straight on the costa and rather blunt at the tip; their ground-colour is gray in the males, with a slight tinge of sepia-brown, and they have various markings of a dark sepia-brown ; they are almost entirely dark sepia-brown in the females ; the claviform spot is black, or nearly so ; the orbicular is very round and very conspicuous, pale gray, with a black, or nearly black, circumscription, and a central dot ; the reniform is partially obscured by a transverse cloud-like bar ; the hind margin is occupied by a broad sepia-brown band : the hind wings are white in the males, smoky-brown in the females, the base of the wing being paler and the wing-rays darker ; there is also a row of linear spots on the hind margin, and a crescentic discoidal spot is just discernible in both sexes : the thorax is varied with two shades of brown in the males ; it is uniform dark brown in the females ; the body is gray-brown.

The CATERPILLAR has been bred by Mr. Buckler, from eggs obtained by Mr. W. Farren. Its medio-dorsal stripe is conspicuously sulphur-yellow on the black shining plate of the second segment only, while on all the other segments scarcely noticeable, and chiefly at the commencement of each a rather paler brown than the mottled portions it runs through. The anal segment is buff colour, forming a conspicuous pale mark above the flap. The sides are blackish-green, bounded above by the sub-dorsal line of rather darker hue, and below by the black spiracles and usual warty tubercles ; the sub-dorsal line is edged below by a fine thread of dirty whitish-green, and another such fine line, but undulating and interrupted, runs between it and the spiracles. Above the legs is a pale thin dirty-whitish line ; the belly and legs slightly darker, of a greenish-drab tint ; the ventral legs are more beneath the body than usual ; all the tubercular warts are blackish, large, and shining. The head is mottled-brownish, with a large black blotch on each side of the crown.

The MOTH appears on the wing in August, but is by no means generally distributed. It is reported from Cornwall, Devonshire, Isle of Wight, Pembrokeshire, Flintshire, and Scotland ; and Mr. Birchall says it is common at Howth, and has occurred at Cork. All my specimens have been taken in the Isle of Wight, where it is attracted by sugar sprinkled on the heads of thistles and knob-weed growing on the chalk-downs. (The scientific name is *Agrotis lunigera.*)



529. The Heart and Dart (*Agrotis exclamationis*).

529. THE HEART AND DART.—The antennæ are ciliated in the male, simple in the female: the fore wings are nearly straight on the costa and blunt at the tip; their colour is umber-brown, the ground-colour rather pale, the spots dark; the claviform is almost black, and is united to, or rather seated on, a slender transverse dark line; the orbicular is less distinct; the reniform is large, distinct, and unicolorous; immediately beyond it, is a curved and zigzag dark line crossing the wing: the hind wings of the male are pale, with darker wing-rays, and a dark but slender hind-marginal line; the hind wings of the female are smoke-coloured; the head, thorax, and body are of the same ground-colour as the fore wings; the collar is very erect, and has a deep brown mark, which, as you look at the face of the moth full in front, has a great resemblance to the conventional representation of a flying bird.

The EGG is laid in June, either on the ground, or on the young leaves of turnips, rape, radishes, or other vegetables, or perhaps on those of dandelions, docks, or other weeds, the young CATERPILLAR at first feeding entirely above ground and on green leaves, but I think this habit only lasts until the second month, when it burrows beneath the surface, and becomes either an entirely subterranean feeder, or a subterranean resident during the day, sometimes ascending plants or garden vegetables by night, and feeding on the leaves. Thus I have often found it on either autumnal or winter greens by night, making copious mines in some of the more solid heads in company with the caterpillar of *Mamestra Brassicæ* already described. It also feeds on the roots of turnips, parsnips, carrots, and mangold wurzel, particularly about the crown and round the base of the tap root: it thus does an almost incredible amount of damage, in this respect vieing with its congener, *Agrotis Segetum*, emphatically known as the "turnip-grub." I have found it at the approach of winter apparently full-fed, although I have ascertained that it continues its destructive operations throughout the winter, so long as it finds roots that it can devour. It shows a decided preference for those turnips commonly known as "white rounds," and should these be sown in the same field with swedes or mangold wurzel, it will exhibit its taste by confining its ravages to the white rounds. The caterpillar is full-fed in September and October, and is then about an inch and a half long, stout, fleshy, and cylindrical; it rolls in a ring when annoyed. The head is slightly narrower than the second segment, into which it can be partially withdrawn. It is glabrous, and of a pale brown colour, with two dark brown marks down the face. The colour of the body is pale dingy-brown, with a double, but slender, medio-dorsal stripe, which appears to be united at the interstices of the segments, but opens, and encloses a small linear space on the disk of each; on each side of the medio-dorsal is a slender and slightly waved stripe, and between this and the medio-dorsal is a series of black dots, one on each side of the first and second segments, two each on the others as far as the twelfth inclusive; on each side of each segment, and below the lateral stripe, are three dots, excepting the first and second, which have but two, and every dot emits a minute bristle: the legs and claspers are concolorous with the body. When full-fed it forms an earthen cocoon, three or four inches below the surface of the ground, and therein changes to a smooth brown shining CHRYSALIS, with a stout body and a sharp anal point.

The MOTH appears in June, and continues on the wing throughout the summer. It is common everywhere. (The scientific name is *Agrotis exclamationis.*)

Obs. 1.—I have followed my usual plan of describing the caterpillar of this most destructive insect without comparing it with that of the closely-allied *Agrotis Segetum*, and have brought out certain characters in each description not mentioned in the other; but there is so great a difficulty in distinguishing the two species when in the caterpillar state, that I have often found the moths of both emerge from the same turnip, when I supposed it contained only the caterpillar of one.

Obs. 2.—The male of this species is the Heart and Dart (*Noctua exclamationis*) of Haworth (*Lep. Brit.*, No. 169), and the female the Pitchy Dart (*Noctua picea*, *Lep. Brit.*, No. 170).

Obs. 3—Owing to an inadvertence, the ordinary form of this abundant moth has not been figured; the varieties represented have been kindly lent for this work by Mr. Bond and Mr. C. Fenn: the spots are usually more separate and distinct.



530. The Heart and Club (*Agrotis corticea*). Males.



530. The Heart and Club (*Agrotis corticea*). Females.

530. THE HEART AND CLUB.—The antennæ are decidedly ciliated in the male, simple in the female: the costal margin of the fore wings is straight, the tip blunt, their colour is smoky gray-brown, with darker blotches and numerous minute transverse lines; the principal blotches are two; the first seems to combine and include the claviform and orbicular, the second the reniform spot; a slender but double transverse line adjoins the first of these on the side nearest the base, and a similar double line adjoins the second blotch on the side nearest the hind margin: the costal margin is spotted with pale and dark; short and slender dark lines and dots are scattered or sprinkled over the entire surface of the wings; in some specimens these are rather crowded, in others distant from each other: the hind wings are pale gray-brown with a very inconspicuous crescentic discoidal spot: the head and thorax are very much the same colour as the fore wings; the body the same colour as the hind wings.

M. Guenée says that he has often met with the CATERPILLAR of this species, but has unfortunately neglected to describe it. I am still more unfortunate in never having seen the caterpillar.

The MOTH appears on the wing at the end of June and beginning of July, and often swarms at the blossoms of the lime, a tree that offers a banquet to bees by day, and to moths by night. It seems very generally

distributed in England, Scotland, and Ireland. (The scientific name is *Agrotis corticea.*)

Obs. This is the Heart and Club (*Bombyx clavigerus*), of Haworth (*Lep. Brit.*, No. 52); the Chain-Shot Dart (*Bombyx connexus, Lep. Brit.*, No. 58); the Pointed Dart (*Bombyx corticeus, Lep. Brit.*, No. 59); the Broad-Veined Dart (*Bombyx venosus, Lep Brit*, No. 60): These are subsequently placed in the *Genus Noctua*, at p. 218 of the same work.



531. The Light-Feathered Rustic (*Agrotis cinerea*).

531. THE LIGHT-FEATHERED RUSTIC.—The antennæ are ciliated in the male, simple in the female: the fore wings are very straight on the costal margin, but rounded at the tip; their colour is pale gray with three slender transverse lines, and two transverse shades; the first transverse line is very short and very near the base, the second is zigzag, and precedes the orbicular spot, which is represented by a mere dot; then follows the first transverse shade which includes the reniform spot, and beyond this is the third transverse line, bent and zigzag: the second transverse shade is parallel with the hind margin; in some specimens especially females, the entire ground colour of the wing is darker, in others only the space between the second and third transverse lines: the hind wings are almost white with darker wing-rays, and a very indistinct crescentic discoidal spot; the head, thorax, and body are pale gray.

"The CATERPILLAR is shining greenish-brown; dorsal and sub dorsal lines darker: between them are small oblique dark streaks (*Treitschke*). On roots of various low plants." *Stainton's Manual*, vol. ii., p. 225.

The MOTH appears on the wing in June, and has been taken in the Isle of Wight, at Brighton, Lewes, and in Gloucestershire, Herefordshire, Pembrokeshire, and Carnarvonshire. (The scientific name is *Agrotis cinerea.*)



532. The Sand Dart (*Agrotis Ripæ*).

532. THE SAND DART.—The antennæ are ciliated in the male, simple in the female: the fore wings are rather long and rather narrow, straight on the costa, and rounded at the tip; their colour is pale gray with a very slight tinge of ochreous; the claviform spot is present, but not strongly marked, the orbicular is small and round, defined by its darker outline only, the reniform is almost square and its disk dark; there are two irregular and interrupted transverse lines, both of them semi-double, and both broken up into spots: the hind wings of the male are white, those of the female slightly clouded, especially on the wing-rays and towards the hind margin: the head, thorax, and body are gray, the body rather the palest.

The Rev. John Hellins has described the CATERPILLAR in the *Zoologist* as having the ground colour varying from a light pea-green to a yellowish-gray (in one instance the caterpillar was green half its length and gray the other half) having a medio-dorsal stripe of a darker shade of the ground colour, but intersected throughout by a very slender pale stripe; there are three slender waved lateral lines on each side; these are placed close together just above the spiracles, and are slightly paler than the medio-dorsal stripe; they are followed by a stripe rather darker than the ground colour, and containing the

spiracles which are black; the head, and a dorsal plate on the second segment are pale brown. These caterpillars were found feeding on hound's-tongue (*Cynoglossum officinale*), which grows on sand-hills by the sea coast, and were fed on the same plant in confinement: they are very fond of burrowing in the sand, and Mr. Hellins thinks some of them hybernate in the sand at a depth of several inches: they always leave off feeding in October.

The MOTH appears on the wing in June and July, and has been taken in Cornwall, Devonshire (at Instow Sand-hills, and Braunton Burrows, Dawlish, and Exmouth), Somersetshire, and Glamorganshire, but I believe always on the sea coast. (The scientific name is *Agrotis Ripæ*.)

Obs. I am indebted to Mr. Vaughan for the use of a beautiful variety.



533. The Coast Dart (*Agrotis cursoria*).

533. THE COAST DART.—The antennæ are very slightly pectinated in the male: the fore wings are rather long and narrow, straight on the costa, and blunt at the tip; their colour is pale gray tinged with ochreous or brown, and presenting in different specimens almost every shade of colour from pale ochreous gray to dark brown; there are evident indications of three darker transverse lines, all of them double; the first is short and indistinct, it is almost close to the base of the wing, and does not reach the inner margin; the second crosses the wing just before the orbicular spot, and is almost straight; and the third is bent and situated beyond the reniform spot: the orbicular spot is almost round and rather paler gray than the rest of the wing; the reniform is larger and conspicuous, it has a pale circumscription; the inclosed area is of two shades, the upper portion paler, the lower darker than the general ground colour: the hind wings are pale gray with a slightly darker marginal cloud, especially towards the tip, and an indistinct crescentic discoidal spot; in the females the wing-rays also are darker: the head and thorax vary in tint with the fore wings: the body is gray in the males, brown-gray in the females.

"The CATERPILLAR is pale ochreous with dark brown dorsal line; spiracular line whitish, edged above with brown: ordinary spots black (*Freyer*) on spurge (*Euphorbia esula*)." *Stainton's Manual*, vol. i., p. 225.

The MOTH appears on the wing in July, and has occurred in Cornwall, Devonshire, Dorsetshire, Kent, Suffolk, Norfolk, Glamorganshire, Denbighshire, Cheshire, and Lancashire; it is also reported from Scotland, and Mr. Birchall says it is very abundant on the Irish coast. (The scientific name is *Agrotis cursoria*.)

Obs. I am indebted to Mr. Bond for the use of an unusually fine series of specimens.



534. The Garden Dart (*Agrotis nigricans*).

534. THE GARDEN DART.—The antennæ are very slightly ciliated in the male, but are evidently stouter than those of the female; the costal margin of the fore wings is slightly arched, and the tip blunt; their colour is dark umber-brown, sometimes slightly tinged with reddish-brown; the claviform spot is connected with the base of the wing by a mixed longitudinal streak which presents an appearance of having had the scales scraped off with a penknife; the orbicular spot is rather depressed, in some specimens a good deal flattened; it has a dark circumscription and a pale disk; the reniform is more perfectly kidney-shaped than in any other of the genus, its circumscription is very dark, its disk rather dark towards the base of the wing, rather pale gray towards the hind

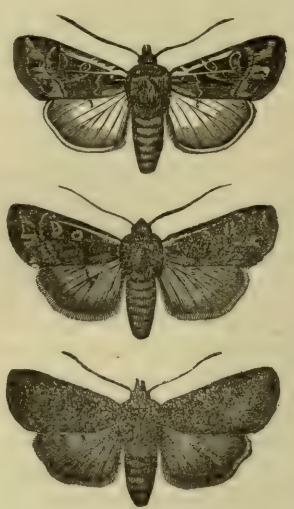
margin; there is a waved series of pale spots six to eight in number parallel with the hind margin; the hind wings are pale at the base, darker and smoky towards the hind margin; they have a crescentic discoidal spot, and some of the wing-rays rather darker.

The CATERPILLAR of this moth has been found by Mr. Doubleday, in the neighbourhood of Epping, and has been carefully described by Mr. Buckler in the *Entomologists' Monthly Magazine:* the egg is laid in July on clover and other plants; the caterpillar when full-grown, is an inch and a-half long, smooth and cylindrical; the colour of the back ochreous-brown, and in some individuals very bright ochreous; a thin gray dorsal line, margined with blackish, and running through a series of blackish-brown triangular and diamond shapes, well defined in some individuals, though obscure in others; sub-dorsal line greenish-black, in some varieties quite black, and edged below with a narrow line of dirty whitish-green, then a broad stripe of blackish-green, followed by another dirty whitish-green, narrow and slightly interrupted, line, and then another darker broad stripe of blackish-green, along the lower edge of which are the black spiracles; a double whitish stripe follows, extending down the sides of the anal claspers, which is made by a line of pale dirty grayish-green, being the colour of the belly and claspers, running through the middle of the white; the ordinary shining warty spots black; the head grayish-brown, mottled, and streaked with black; a dark brown shining plate on the back of the second segment, with three paler grayish lines; some of these caterpillars presented great resemblance to several of the varieties of *Agrotis Tritici*, but the double white stripe above the feet, and black warty dots, give distinct characters to the caterpillars of *Nigricans*.

Obs. This is another most destructive caterpillar, and Mr. Doubleday has communicated to me some interesting particulars of its ravages in 1865, near Epping. In one instance, a field of ten acres, sown with wheat in the autumn and with clover in the spring, was attacked so vigorously that by the 17th of May not a clover leaf was to be seen: it is not a little remarkable that the wheat remained entirely uninjured, and that when the clover and weeds too commonly sown with clover seed had been utterly consumed, the caterpillars betook themselves to the hedges and devoured every green leaf they could find; every kind of weed, even the large umbellifers were entirely stripped, but grasses of every kind were spared. I am indebted to Mr. Last as well as Mr. Doubleday for specimens of these caterpillars, and have described them for publication, but prefer quoting Mr. Buckler's description as a just compliment to one who has done so much to elucidate the natural history of our British Lepidoptera.

The MOTH appears on the wing throughout July, and is only too common throughout the country. (The scientific name is *Agrotis nigricans.*)

Obs. This is the Dark Rustic (*Noctua fumosa*) of Haworth (*Lep. Brit.*, No. 173); the Garden Dart (*Noctua nigricans, Lep. Brit.*, No. 174); the Rufous Dart (*Noctua ruris, Lep. Brit.*, No. 175); the White Line (*Noctua dubia, Lep. Brit.*, No. 176); and the Square Spot Dart (*Noctua obeliscata, Lep. Brit.*, No. 177).



535. The White-line Dart (*Agrotis Tritici*).

535. The White-line Dart.—The palpi are porrected, slightly ascending, and rather distant: the antennæ of the male are slightly serrated, those of the female simple: the fore wings are straight on the costa, blunt at the tip, and rather rounded on the hind margin; their colour is dark bistre-brown, more or less varied with pale wainscot-brown; of this latter colour there is generally but not always a rather conspicuous dash beneath the costa, extending from the base to the reniform; the discoidal spots are generally very distinctly outlined with the paler colour, and have a darker central area; the orbicular is small, oval, and oblique; some of the wing-rays are often pale, and there is generally a sinuous line or interrupted series of linear spots parallel with the hind margin, from which emanate three, four, or five elongate wedge-shaped spots, the tips of which point towards the middle of the wing: the hind wings are pale at the base, the wing-rays and hind margin being smoky-brown; the fringe is paler: the head and thorax are bistre-brown, freckled with gray scales; the body is uniform smoky-brown.

The caterpillar of this very common species has a rather small and porrected head, and an obese cylindrical and shining body, in which the usual minute warts are not conspicuous, and each emits a short hair: the head is shining, of a pale brown colour mottled with darker brown: the second segment has a dark brown glabrous plate; the dorsal area of the body is gray-brown, with a narrow medio-dorsal stripe considerably paler; there is a narrow lateral stripe on each side, not far from the medio-dorsal, and of the same pale hue, and all these three stripes pass through the dorsal plate of the second segment, and come close to the head; the sides of the caterpillar are dingy green, intersected throughout by a narrow grayish stripe; the spiracles are black; the ventral is paler than the dorsal area, and the claspers are concolorous. It feeds at the root of all kinds of garden weeds and vegetables, and changes to a chrysalis beneath the surface of the ground.

The moth appears on the wing in July, and appears very generally distributed over England: it is also reported from Scotland, and Mr. Birchall says it is common everywhere on the coast of Ireland. (The scientific name is *Agrotis Tritici.*)

Obs.—This is the White-line Dart (*Noctua albilinea*) of Haworth (*Lep. Brit.*, No. 180); the Lineolated Dart (*Noctua lineolata, Lep. Brit.*, No. 181); the Pupilled Dart (*Noctua pupillata, Lep. Brit.*, No. 183); and the Gothic Dart, (*Noctua subgothica, Lep. Brit.*, No. 185.)



536. The Streaked Dart (*Agrotis aquilina*).

536. The Streaked Dart.—The palpi are porrected, slightly ascending, and rather distant; the antennæ of the male are stout and slightly separated, those of the female more slender and quite simple: the fore wings are straight on the costa, and blunt at the tip; their colour is umber-brown, sometimes with a paler dash under the costa; the discoidal spots are well defined, outlined with pale brown, and having darker centres; there is generally a pale sinuous line or interrupted series of pale linear spots parallel with the hind margin, from which emanate three, four, or five elongate wedge-shaped spots, the tips of which point towards the middle of the wing: the hind wings are pale at the base, with darker crescent-shaped discoidal spot, wing-rays, and hind margin: the head and thorax are umber-brown; the body smoky-brown.

The caterpillars of this moth have been discovered by Mr. Last, of Ipswich, at the roots of various vegetables, especially where growing among weeds; they feed on chickweed, cabbage, broccoli, onions, poppies, plantain, &c. The caterpillar, when full-grown, is thus described by Mr. Buckler, in

No. 18 of the *Entomologists' Monthly Magazine* :—

"It is an inch and a half long, cylindrical, and rather shining. The head gray-brown, mottled with blackish; the back dingy-brown, a dorsal line of rather paler gray-brown, the sub-dorsal line black, edged below with a thin line of gray-brown, and which, like the dorsal line, runs through the blackish plate on the second segment; to this succeeds a broad stripe of dingy blackish-green, then another thin line of gray-brown, followed by another broad stripe of dingy blackish-green, the black spiracles being situated along its lower edge; the belly and legs gray-brown, the warty spots dark brown and not very conspicuous; the general aspect of the caterpillar very dark and dingy."

The MOTH appears on the wing in July and August, and occurs not uncommonly in our English counties, but it is so imperfectly known, and so rarely distinguished from the preceding, that no confidence whatever can be placed in the recorded habitats. Mr. Birchall informs us that it has been taken at Malahide Sand-hills in Ireland. (The scientific name is *Agrotis aquilina*.)



537. The Square Spot Dart (*Agrotis obelisca*).

537. THE SQUARE SPOT DART.—The palpi are porrected and prominent; the antennæ are very stout and slightly serrated in the male, rather slender and simple in the female: the colour of the fore wings is sepia-brown; there is a gray shade beneath the costa; the discoidal spots are distinct, and rendered more so by the space between them being intensely dark brown or almost black; a similarly coloured wedge-shaped spot adjoins the orbicular pointing towards the base, and below the orbicular and extending nearly to the base of the wing, is a compound mark of the same colour; there are also two iterrupted transverse lines or rather irregular series of dark marks, the first before the orbicular, the second beyond the reniform: the hind wings are very pale in the males with darker wing-rays and hind margin, smoky brown in the females: the head and thorax are dark brown; the body paler, and with a slight appearance of still paler rings.

The CATERPILLAR rests in a nearly straight position on the slender stems of its food-plant; when anoyed it falls to the ground in a compact ring: the head has a rather flat face, and is considerably narrower than the second segment, into which it is partially received; the body is very stout, smooth, and almost uniformly cylindrical; its colour is pale testaceous-brown, with a slender white medio-dorsal stripe, which is bordered on each side by a still more slender and threadlike black stripe; there is a similar white stripe, delicately black-bordered on each side of the caterpillar, and, connecting the medio-dorsal with the lateral stripes; there is also a short oblique stripe on each side of each segment, each pair of oblique stripes forming a letter V, the apex of which is directed towards the anal extremity; below these, and in the region of the spiracles, is a series of round dots, ten on each segment, and also a short oblique line: the ventral is concolorous with the dorsal area, and the claspers are also of the same colour, and just above each is a black dot. It feeds on the ladies' bedstraw (*Galium verum*).

The MOTH appears on the wing in August, and occurs pretty abundantly in the Isle of Wight, whence I received the series in my possession; it has also been taken at Brighton; it is reported by the Rev. Harpur Crewe from Derbyshire, and from Lancashire by Mr. Birchall, who has also taken it in Ireland: this indefatigable entomologist writes of the species thus: "Abundant at Howth; frequents the higher slopes of the hill, where it may be taken freely from the rag-wort flowers in August in company with *Lunigera*. Although *Tritici* swarms at the foot of the hill and a long

the shore, it rarely intrudes on the more aristocratic society of the higher levels." (The scientific name is *Agrotis obelisca.*)



538. The Heath Rustic (*Agrotis agathina*).

538. The Heath Rustic.—The palpi are porrected, slightly ascending, and rather distant; the antennæ are slender in both sexes, but rather stouter in the male, and slightly serrated; the fore wings are straight on the costa, obtuse at the tip, and waved on the hind margin; their colour is brown glossed and tinged with a rich vinous red; there is a pale dash on the costa, extending from the base to two-thirds of its length; the orbicular is pale, clearly defined, and very conspicuous; the reniform is outlined in pale gray, but not so conspicuous as the orbicular; its exterior border is indistinct, the space between the discoidal spots is very dark brown, and there is a triangular mark of the same colour on the basal side of the orbicular, and pointing towards the base of the wing; below this are two whitish marks; a broken series of pale markings crosses the wing just beyond the middle, and of this the reniform forms a part, and a second broken series is parallel with the hind margin, and terminates in a rather conspicuous pale blotch near the anal angle: the hind wings are waved on the hind margin, very pale brown with crescentic discoidal spots, a transverse median line, a broadish marginal bar darker brown; the thorax and body are reddish-brown.

The caterpillar does not roll itself in a ring when touched, but falls off its food, and, bending its body slightly at both extremities, remains motionless a short time, feigning death. In form it is almost uniformly cylindrical, but slightly decreases in size at either end, it is smooth and velvety: the head is rather small and very shining, of a pale dull green or dull brown, with two obscure longitudinal darker markings: the body is of different ground colour in different individuals, the prevailing hues are green and brown, in all instances adorned with five longitudinal white stripes, all of which are more or less interrupted by folds in the skin, especially at the interstices of the segments: three of these are brighter and more distinct than the remaining two, and may be called dorsal, the remaining two are lateral, and are tinged more or less with the ground colour of the body: the medio-dorsal stripe is found on close examination to be composed of a series of shuttle-shaped markings, placed end to end: the next stripe on each side is bordered on its upper or dorsal margin with velvety black, massed on each segment into a conspicuous blotch: the lower margin is also bordered, but less conspicuously, with black: the lateral stripe is broader and more diffused, as well as less conspicuous, than the others: it encloses the spiracles, which are ranged just within its upper margin, excepting the last and last but one, which are placed above the stripe; by these five stripes the dorsal surface of the body is divided into four nearly equal compartments, all of which are alike in ground colour, whatever its tint, and are delicately mottled with velvety black: the under surface bordering the lateral stripe partakes of the same colour, but the ventral area, legs and claspers, are paler, having a semi-transparent appearance. It feeds on the common ling (*Calluna vulgaris*) principally at night, when it is swept off the food-plant in early spring by collectors who are acquainted with its habits; it is full-fed about the end of May.

The moth appears on the wing in August, as soon as the heaths are in full flower, when

it frequents the blossoms more particularly of those which grow under the shade of trees. It has occurred a Lyndhurst, in the New Forest; at Weybridge and West Wickham, in Surrey; and also in Lancashire and Yorkshire. Mr. Birchall has taken it not uncommonly at Howth, and in the county Wicklow, in Ireland, by sweeping heath at night in August and September. (The scientific name is *Agrotis agathina*).



539. The True Lovers' Knot (*Agrotis porphyrea*).

539. THE TRUE LOVERS' KNOT.—The palpi are porrected and slightly ascending; the scales on the second joint extend to the tip of the apical joint, making each palpus look bifid; the antennæ are slightly serrated in the male: the fore wings are nearly straight on the costa, blunt at the tip, and entire on the hind margin: their colour is brickdust red, with numerous nearly white markings; the discoidal spots are outlined in white, but each has a darker area; the parts between and around them are also darker—indeed, very dark brown; there are seven white spots on the costa, four rather large ones at equal distances, the second and fourth of which seem to originate transverse zigzag white lines, the first before the orbicular, the second beyond the reniform; the seventh costal spot is near the tip, and extends a considerable distance into the wing, and is followed by a series of white dots irregularly parallel with the hind margin; most of the wing-rays are also white for the whole or the greater part of their length; most of the white markings are accompanied by darker blotches, which make them more conspicuous: the hind wings are pale grayish-brown, darker towards the hind margin: the thorax is variegated with the colours of the fore wings, the body has the more uniform colour of the hind wings.

The CATERPILLAR is uniformly cylindrical; the head is very shining, and of a pale brown colour; the body is umber-brown, paler between the segments: on the back are three series of linear clearly-defined whitish marks placed end to end; the first series is median, and extends from the third to the tenth segment, both inclusive, and consisting, therefore, of nine spots; the first of these, that on the third segment, is circular; that on the fourth oval; the rest are linear; on each side of this series is a lateral series of similar whitish linear spot, and these commence on the fifth segment, and extend to the thirteenth; below these lateral series of whitish spots there is a whitish stripe which includes the spiracles, which are black; the legs are very shining, pale brown, spotted with black; the claspers are pale. It feeds on the common ling (*Calluna vulgaris*) only in the night. The EGGS are laid and hatched in the autumn, and the caterpillar hybernates: in April it begins to feed again, and is full-fed in May: it then spins a slight cocoon on the surface of the ground, and therein changes to a CHRYSALIS.

The MOTH appears on the wing in June and July, and occurs in every locality I have visited where the common ling grows abundantly, hiding among the branches of that plant until disturbed by the entomologist. Mr. Birchall says it is very common at Howth, in Ireland, secreting itself by day among the broken limestone shale. (The scientific name is *Agrotis porphyrea.*)



540. The Portland Moth (*Agrotis præcox*).

540. THE PORTLAND MOTH.—The palpi are short and inconspicuous, and the antennæ slender in both sexes; the fore wings are straight on the costa and blunt at the tip; they

are decidedly narrow, the costal and hind margins being nearly parallel; their colour is pale obscure green, with numerous very distinct markings, most of them black; the orbicular and reniform are outlined in black, the area enclosed by the black outline is light gray, with a median darker shade, which in the orbicular is indistinctly circular, and in the reniform has somewhat the shape of an hour-glass; there are three zigzag black lines, the first short and near the base, the second is before the orbicular, and the third beyond the reniform; beyond the third is an elbowed reddish bar parallel with the hind margin, but not quite reaching the costa, and on the hind margin itself is a linear series of elongate black spots: the hind wings are smoky-brown, paler at the base, having an obscurely crescent-shaped discoidal spot, and a black marginal line: the thorax is pale greenish-gray, dotted with black: the body is of the same colour as the hind wings.

The head of the CATERPILLAR is very pale brown, broadly notched on the crown, and there is a dark V-shaped mark pointing backwards on the face: the colour of the body is very various: a medio-dorsal series of longitudinal gray markings, each extending almost the length of a segment and dilated posteriorly; these markings are margined on each side by others of a smoky-brown, which are narrowed to mere lines in front, but dilated posteriorly: on each side of the narrowed portion is a spot of the same colour; all the aforesaid markings constitute a variegated median stripe; on each side of this is a ferruginous stripe, interrupted at the segmental divisions, and below this on each side is a narrow stripe extending to the spiracles, which are black; there is a gray stripe below the spiracles; the belly is dingy gray: it feeds on chickweed (*Alsine media*), and is full-fed at midsummer, when it changes to a CHRYSALIS just below the surface of the earth.

The MOTH appears on the wing in August; it has been taken both on the north and south coasts of Devonshire by Mr. Reading, in Dorsetshire by Mr. Dale, in Kent, Norfolk, Suffolk, in South Wales, Cheshire, and Lancashire. Mr. Douglas Robinson reports it from Scotland, and Mr. Birchall says it is common on the sand-hills of the Dublin coast. (The scientific name is *Agrotis præcox*.)



541. The Stout Dart (*Agrotis ravida*).

541. THE STOUT DART.—The palpi are porrected and slightly ascending; the second joint is cup-shaped, the third very small and scarcely perceptible: the antennæ are simple and slender: the colour of the fore wings is dingy brown with very obscure and inconspicuous markings: the orbicular is longitudinally elongate and oblique; it is outlined in black, but the median area is concolorous with the general ground colour of the wing; the reniform is incomplete, being outlined in black on its interior border only; the hind wings are pale gray-brown, the wing-rays and hind margin rather darker: the head and thorax are the same colour as the fore wings, the body the same colour as the hind wings.

The CATERPILLARS were found by Mr. Doubleday just below the surface of the ground, at the roots of thistles and dandelions; they feed greedily on the leaves of the latter. Mr. Buckler has described three varieties in No. 17 of the *Entomologists' Monthly Magazine*, as under:—

Var. 1. Caterpillar yellowish-brown, slightly tapering near the head, but almost of uniform thickness, and cylindrical; a thin dorsal line slightly paler than the ground colour, and running through a dusky V-like streak at the end of each segment after the fourth. At the commencement of the fourth segment, on each side, and close to the division, is a sub-dorsal ochreous-yellow spot, which, on the fifth to

the eleventh, inclusive, has an almost confluent yellow waving curved streak, extending along two-thirds of each segment, becoming less curved towards the twelfth, on which they are straight, and slightly converging at the end of that segment, where they are margined above with dusky brown wedge-shaped streaks pointing forwards, and a dusky edging above to the curved yellow streaks, but gradually less intense towards the head on the other segments.

The sides and belly, with legs, brownish-gray; a paler grayish stripe freckled with dusky atoms above the the feet; immediately above that are the spiracles, minute and dirty white in a dusky blotch, which emits an oblique dusky streak, extending to the sub-dorsal marking of the segment in advance. Head gray, mottled and streaked on the lobes and face with dusky brown; a dull brown plate on the second segment, with slight indications of dorsal and sub-dorsal faint lines through it.

Looking on the back of this caterpillar, the yellow marks on each side are suggestive of a series of incomplete horse-shoe shapes.

The MOTH appears on the wing in July; it occurs in Devonshire, having been taken by Mr. Dorville at Alphington, and by other entomologists at Torquay; also in Dorsetshire by Mr. Dale; in Kent, Essex, and Norfolk, and Suffolk, in nearly all the midland and northern counties, extending even into Scotland. (The scientific name is *Agrotis ravida.*)



542. The Dotted Rustic (*Agrotis pyrophila*).

542. THE DOTTED RUSTIC.—The palpi are short but ascending, approximate, and very inconspicuous; the antennæ are slender and simple: the colour of the fore wing is gray-brown; the discoidal spots are very indistinct and very near together; beyond the reniform is a transverse series of black dots, and on the hind margin itself a similar series; the hind wings, head, thorax, and body, are also grayish-brown.

"The CATERPILLAR is dull gray-brown (*Treitschke*) on grasses and low plants" (*Stainton's Manual*, vol. i., p. 228).

The MOTH appears on the wing in July, and seems to be local, rare, and most imperfectly known; it has been reported from Dorsetshire, Hampshire, Berkshire, Gloucestershire, Worcestershire, Staffordshire, Derbyshire, Lancashire, Yorkshire, Cumberland, and Scotland (The scientific name is *Agrotis pyrophila.*)



543. The Northern Rustic (*Agrotis lucernea*).

543. THE NORTHERN RUSTIC.—The palpi are porrected and slightly ascending, the terminal joint projects slightly beyond the scales of the second; the antennæ are long and simple in both sexes, but rather stouter in the male; the fore wings are slightly arched on the costa, blunt at the tip, and rather broad; their colour is smoky-gray, suffused in some specimens with a decidedly ochreous tint, and having three very indistinct and irregular darker lines, the first of which is very short and almost close to the base; it scarcely reaches half-way across the wing; the second is before the usual site of the orbicular; the third beyond the usual site of the reniform, but *I*

can discover no trace of the former, and a mere cloud indicates the usual position of the latter; between the second and third transverse lines there is a transverse shade which includes the reniform, and beyond the third transverse line is a dark band rendered rather more conspicuous by a lighter line which melts into the hind marginal area: the hind wings are smoky, and paler at the base; the fringe is very pale, almost white: the head, thorax, and body are smoky-gray.

The CATERPILLAR rolls in a ring when touched, feigning death, and falling off its food-plant; in shape it is almost uniformly cylindrical: the surface is smooth and velvety; the head is shining, its triangular plate intensely black; its hemispheres mottled with black and gray-brown: the colour of the body is a mottled mixture of gray-brown and black-brown, the darker colour assuming somewhat the form of a double medio-dorsal series of V-shaped markings, the tips of the V's directed towards the head; the space within each V is only a shade paler than the V itself, but terminates at its tip in a very decided pale spot, which has a black dot in the middle, the dot emitting a black bristle; the legs are black and shining; the claspers pale; the spiracles almost white, but surrounded by a black space. In a state of nature it feeds on the common yellow-flowered stone-crop, and occasionally also on grasses. In confinement the caterpillars fed voraciously by night on the leaves of the common harebell (*Campanula rotundifolia*), but concealed themselves in peat-earth by day; they were full-fed and finally buried themselves on the 1st of May.

The MOTH appears on the wing in July: it is rather abundant in Cornwall and Devonshire, particularly about Whitsand Cliffs, Bovisand, and Torquay. Mr. Reading, who has paid so much attention to the Lepidoptera of this district, says it has the habit of flying from flower to flower in the sunshine; it has also been taken in the Isle of Wight, on the coast of Kent, in South Wales, and in several Scotch localities: Mr. Birchall informs us it is very common at Howth, in Ireland. (The scientific name is *Agrotis lucernea.*)



544. Ashworth's Rustic (*Agrotis Ashworthii*).

544. ASHWORTH'S RUSTIC.—The palpi are porrected and slightly ascending; the basal joint is black, the second joint black at the base, and white and very scaly at the tip; the third or apical joint is very small and short, and is received into the second joint and almost hidden like an egg in its nest: the fore wings are very slightly curved on the costa and blunt at the tip: their colour is the most delicate blue-gray approaching to dove-colour, with three very narrow transverse black lines; the first of these is at the base and very short, beginning at the costa and scarcely reaching half across the wing; the second is before the orbicular and waved, but pretty direct; and the third is beyond the reniform, very much bent and very zigzag; between the second and third is a transverse smoky shade, and in this the orbicular and reniform may be traced, but are very inconspicuous; parallel with the hind margin there is, in some specimens, a narrow, waved, darker bar, but this is by no means constant; the hind wings are smoky-gray, paler at the base, and having darker wing-rays; the head and thorax are gray, the body pale gray, and very downy at the base, rather darker towards the tip.

The CATERPILLAR rolls in a compact ring, feigning death and falling off its food-plant when touched. In shape it is almost uniformly cylindrical, quite smooth and velvety: the head is bright red and shining; the body is

uniformly coloured, generally smoky-green; in some specimens olive-green, in others smoke-coloured, with scarcely a perceptible shade of green: on the dorsal surface of each segment are two somewhat distant conspicuous markings of an intense velvety black: the figure of each of these markings is that of a longitudinally elongated square or parallelopipedon, its limits always clearly defined but not very regular; near the head these markings become narrower or more linear, and the pair on the twelfth segment are also narrow and placed obliquely; the legs are red-brown and very shining.

These caterpillars feed on the fescue-grass (*Festuca ovina*), several species of hawk-weed (*Hieracium*), sun cistus (*Cistus helianthemum*), wild thyme (*Thymus Serpyllum*), devil's bit scabious (*Scabiosa succisa*), golden rod (*Solidago Virgaurea*), burnet (*Poterium Sanguisorba*), &c.; and in confinement revel on sallow (*Salix caprea*), especially the catkins. They feed by night only, and bury themselves in the earth by day; they were full-fed and finally disappeared beneath the earth on the 8th of May.

The MOTH appears on the wing in August, and hitherto has only been taken in the neighbourhood of Llangollen, in North Wales. (The scientific name is *Agrotis Ashworthii*).



545. The Lesser Broad-Border (*Tryphæna ianthina*).

545. THE LESSER BROAD-BORDER.—In all the "yellow underwings" the palpi are inconspicuous; the antennæ in both sexes simple, and the fore wings rather narrow and rather elongate; the hind wings are very ample; in the Lesser Broad-Border the colour of the fore wings is rich brown, glossed and tinted with purple reflections; the costa is very pale at the base, the pale portion being confined to a mere marginal line: there are three delicate clouds of a gray tint descending from the costa obliquely towards the middle of the wing, and nearer the tip of the wing is a transverse series of pale spots parallel with the hind margin; these are generally not more than three or four in number, and are confined to the costal portion of the wing; the discoidal spots are imperfectly indicated by portions of a gray outline: the hind wings are bright orange in the middle, and on the hind margin, and black at the base; they have also a broad waved band of intense black parallel with the hind margin: the head and collar are very pale, the thorax and body are rich brown, with a vinous tint.

The CATERPILLAR is by no means common; it occurs sometimes at the roots of polyanthuses and other garden plants, concealing itself by day and feeding by night; it eats into the crown, and also feeds on the leaves of these and other garden plants: the head is smaller than the second segment, and very shining; the body obese, smooth, and velvety; the colour of the head is dull testaceous-brown, of the body dingy ochreous, with a paler narrow medio-dorsal stripe on each side of each segment after the seventh, and there are two conspicuous black spots on each side of the ninth, tenth, eleventh, and twelfth segments, the ventral is paler than the dorsal surface, and the legs and claspers are concolorous. The egg is hatched in the autumn, and the caterpillar feeds through the winter, and is full-fed in April and May, when it buries itself just below the surface of the earth, and changes to a smooth red-brown CHRYSALIS.

The MOTH appears on the wing in July, and occurs in most of our English, Scotch, and Irish counties. Mr. Reading says it is common throughout Cornwall and Devonshire; and going thence northward and eastward, I find the name in almost every local list. (The scientific name is *Tryphæna ianthina.*)

Obs.—The colour of the fore wings is remarkably rich and attractive, and is less liable to vary than in any other species of the genus *Tryphæna.*



546. The Broad-Bordered Yellow Underwing (*Tryphæna fimbria*).

546. The Broad-Bordered Yellow Underwing.—The antennæ are white at the base: the colour of the fore wings is pale wainscot-brown, or rich mahogany-brown, or rich olive-green; the specimens of the mahogany-brown colour are comparatively rare, those with the wainscot-brown and olive-green colour are equally common; the two discoidal spots are very close together, and sometimes, although rarely, united; they are clearly marked by a pale and very fine outline, but the enclosed area differs little from the general ground-colour; there is a pale transverse bent line beyond the discoidal spots, and another pale line nearly straight, parallel with the hind margin: the area enclosed between these two lines is paler than the rest of the wing, and has a darker blotch on the costal margin; the hind wings are dark orange at the base and on the hind margin, between which parts intervenes a broad band of the most intense black: the head and thorax are of the same colour as the fore wings; the body is dark orange.

The CATERPILLAR rolls in a ring when touched, feigning death and falling off its food-plant: it is smooth, cylindrical, gradually diminishing in size from the twelfth segment towards the head, which is remarkably small for the size of the caterpillar: the colour of the head is shining clay-brown, mottled and reticulated with darker brown; the body is clay-brown, mottled, and velvety; the second segment has three narrow longitudinal pale lines; on each side of each segment there is an indistinct oblique pale stripe; along the back is a median series of obscure darker marks, seated in the interstices of the segments; the spiracles are pale and each seated in a dark brown mark; on the twelfth segment is a pale and a dark transverse mark; the belly, legs, and claspers are paler than the back. The egg of this beautiful moth is laid on birch (*Betula alba*), sallow (*Salix caprea*), and several other trees early in the autumn, and the young caterpillar remains on the tree until the approach of winter, when it descends to the ground and hybernates: in the spring it ascends the trunk every night as soon as it is dark, and devours the newly-expanded leaves, then very small, again retiring to the ground before the approach of daylight. It is generally full-fed before the middle of May, when it finally changes to a CHRYSALIS on the surface of the ground. When full-fed it is very conspicuous on the almost naked twigs of the birch, and is readily procured by collectors who seek it by lamp-light.

The MOTH appears on the wing from June to September, and occurs not unfrequently in most of our English, Scotch, and Irish counties. (The scientific name is *Tryphæna fimbria*.)

Obs.—Like the last, this species is remarkably rich in colour and attractive in appearance, but differs from that in being subject to three very marked varieties of colour: those of the mahogany-brown tint are very uncommon.



547. The Least Yellow Underwing (*Tryphæna interjecta*).

547. The Least Yellow Underwing.—The colour of the fore wings is rusty-brown, sometimes inclining to brickdust-red, and having a broad but imperfectly defined band of smoky-brown on the hind margin: this band is intersected throughout by a pale line; the discoidal spots are indistinctly outlined in dark brown, and there are several other short and narrow transverse darker markings: the hind wings are yellow in the middle and on the hind margin; smoky-black on the costal margin, and having a broad smoky-black band before the hind margin; the inner margin is clouded with the same smoky-black; there is a crescentic discoidal spot of the same black tint united with the black on the costal margin; the head and thorax are of the same rusty colour as the fore wings; the body is gray-brown.

The caterpillar rests in a straight position on the stems of its food-plant, and when shaken or annoyed it falls to the ground rolled in a ring, but very soon resumes the straight position and crawls with rapidity: the head is narrower than the second segment, into which it is partially received; it is porrected, flat, rather glabrous, and not notched on the crown; the body is obese and rather velvety, and has the divisions of the segments strongly marked; it is somewhat attenuated at the anterior extremity, and has the twelfth segment dorsally slightly swollen: the prevailing colour of both head and body is putty-colour; the head has two dark brown marks down the face, and outside of each of these is a pale mark; the body has a narrow medio-dorsal white stripe, bordered on each side by brown slightly darker than the ground colour; near the medio-dorsal on each side is another narrow white stripe similarly bordered, and differing only in being somewhat less distinct; on each side in the region of the spiracles, but just above them, is a broader and triple stripe, the outer portion on each side being whitish, the middle reddish; and this compound stripe is also bordered with brown, particularly on its upper margin; the dorsal area is ornamented with a number of intensely black dots; on the second segment these are very minute and apparently without much arrangement; on the third they form a straight transverse series and are eight in number; on the fourth they also form a straight series and are six in number; on the following segments, the fifth to the eleventh, both inclusive, they are also six in number on each segment, but no longer form a straight series; two near the anterior margin of the segment are larger than the rest, the next on each side stands back about the middle on the dorsal area of the segment, and the third on each side is nearer the anterior margin; the twelfth segment has four of these black dots arranged in a perfect square; the ventral is slightly darker than the dorsal area, and has a double series of black dots below the compound lateral stripe: the legs are pale, semitransparent, and shining; the claspers are semitransparent, and each has a distinct black dot and a crescentic black mark above it: in the interspaces between the stripes which I have described there is a further indication of stripes, but these are very inconspicuous: it feeds on dock, mallow, grass, &c. &c.

The moth appears on the wing in July, and occurs occasionally in most of our English counties as far north as Yorkshire, and also very generally in Ireland; but I do not recollect seeing any Scotch localities recorded. (The scientific name is *Tryphæna interjecta*.)

Obs.—Like *Tryphæna ianthina*, this species is very uniform in tint and constant in its markings; but compared with either *ianthina* or *fimbria*, it is very unattractive in appearance.



548. The Lunar Yellow Underwing (*Tryphæna subsequa*).

548. The Lunar Yellow Underwing.—The fore wings are narrow, the costal and inner margins being almost parallel; their colour is rather various, generally gray-brown; the discoidal spots are clearly outlined with pale wainscot-brown; on the costal margin, towards the tip, is a transverse black spot very conspicuous; the other markings are inconstant: the hind wings are yellow, with a smoky cloud along the costal margin, and somewhat radiating from the base; there is a distinct crescentic discoidal spot, and a waved black band parallel with the hind margin: the head, thorax, and body are gray-brown.

The caterpillar is only known to me through Mr. Stainton's description, which is as follows:—"Brownish-gray with a slight greenish tinge; the second segment dark brown; dorsal and sub-dorsal lines paler; above the latter is a row of quadrangular blackish spots (*Freyer*). On various low plants." (*Stainton's Manual*, vol. i. p. 230.)

The moth appears on the wing in July, but is either very rare in this country, or from its great similarity to *Orbona*, very seldom noticed; it is recorded from Dorsetshire, and the New Forest in Hampshire, from Suffolk, Derbyshire, and Nottinghamshire, and I have taken it at Peckham. (The scientific name is *Tryphæna subsequa*.)

Obs.—This species, so frequently spoken of as doubtfully distinct, is, in my opinion, as good a species as either of the others, although its superficial resemblance to *Orbona* is certainly very striking: it may be distinguished on comparison with that much commoner insect by its narrower wings and the constant presence of the black mark on the costa.



549. The Lesser Yellow Underwing (*Tryphæna orbona*).

549. The Lesser Yellow Underwing.—The fore wings are rather broad, and very various in tint, varying from pale gray-brown to dark umber-brown; some again have a very uniform colour, while others are a good deal variegated, and there is a striking variety with two transverse zigzag lines across the wings; the discoidal spots are distinctly outlined with pale wainscot-brown, the median area of each being of a darker shade than the general area of the wing: the hind wings are yellow, with a smoky cloud along the costal margin, a distinct black crescentic discoidal spot, and a waved black band parallel with the

hind margin; the head, thorax, and body have the same variation in general tint as the fore wings.

The EGG is laid in July, on a number of low plants, on which the young CATERPILLARS feed; one of those very commonly selected is the common chickweed (*Alsine media*); they are hatched in August, and hybernate early: as soon as the buds of the sallow and whitethorn open, they ascend the stems and feed on the young leaves. The caterpillar is full-fed in May, when it rolls into a compact ring if disturbed. The head when moving is porrected, and is rather narrower than the body; the body is velvety, nearly uniformly cylindrical, but increasing almost imperceptibly to the twelfth segment, which is the largest; the colour of the head and body is dingy umber-brown, the head being slightly variegated with darker shades of the same colour; the dorsal region of the body is uniformly brown; the anterior segments from the second to the fifth, both inclusive, are interrupted by a median very narrow and very indistinct line; the eleventh and twelfth segments have each two very conspicuous velvety dorsal markings almost black; on the eleventh segment these are distant, narrow, longitudinal, and waved; those on the twelfth segment are decidedly more approximate, broader, and larger; their figure is irregular, but their anterior extremity is pointed, the posterior extremity square; the spiracles are white, and are situated at the extreme edge of the brown dorsal area; below them is a broad pale wainscot-brown stripe extending the entire length of the caterpillar, and this, from the second to the seventh segment, is tinged along the middle with brick-red; the belly is smoky-brown, and the legs and claspers are of the same colour. It changes to a smooth brown CHRYSALIS on the surface of the earth.

The MOTH appears on the wing in July, and is common everywhere. (The scientific name is *Tryphæna orbona.*)

Obs.—I am indebted to Mr. Bond for the variety represented in the third figure, and to Mr. Wellman for the richly-marked variety represented in the fourth figure.



550. The Large Yellow Underwing (*Tryphæna pronuba*).

550. THE LARGE YELLOW UNDERWING.—In different specimens the fore wings vary in general colour, from pale wainscot-brown to rich umber-brown, and occur with almost every intermediate shade; the discoidal spots are generally clearly defined, the circumscription being paler than the ground-colour; in some specimens the orbicular is entirely pale; there are many transverse lines, some darker and some paler; but these are very variable and inconstant; there is, however, a pale line parallel with the hind margin, almost invariably present, and adjoining the upper or costal extremity of this is a double black spot: the hind wings are orange-yellow without a discoidal spot, but having a narrow waved black band parallel with the hind margin; the head and thorax are of the same colour as the fore wings; the body paler, and inclining to reddish-yellow towards the tip: on the last segment but one is a transverse black spot.

In a beautiful variety, in which the fore wings are much variegated, the head and collar are pale brown.

The EGGS are laid in July on almost every kind of vegetable or plant grown in gardens, and the young CATERPILLAR feeds throughout the autumn, winter, and spring on the stem or heart—hence the French name of *ver du cœur*. It conceals itself almost entirely during the day beneath the surface of the ground, emerging at night: I have frequently found it concealed about the roots of lettuces, and brought to light when they are pulled up for the table: when thus exposed it rolls itself in a very compact ring. The head is glabrous, and small in comparison with the size of the body, which is full, obese, and velvety. The colour of the head is reddish-brown, of the body very various: it is of all shades, from pale sickly yellowish-green to a dark dingy brown: there is generally a narrow yellowish medio-dorsal stripe, on both sides of which is a brownish stripe, making the medio-dorsal more conspicuous; and below this is a longitudinal series of seven or eight linear black or very dark marks, one on each side of each segment, generally commencing with the fifth, but sometimes with the sixth segment; below these is another pale and yellowish, but very indistinct stripe, and again below this a darker stripe also indistinct, and containing the white spiracles, each surrounded with black; the ventral is usually paler than the dorsal area; and the legs and claspers are concolorous. I have found it full-fed in March, April, May, and June, when it changes to a stout, smooth red-brown CHRYSALIS, just below the surface of the earth, in an oval cell or cavity of its own making.

The MOTH appears on the wing in June, and is common everywhere. (The scientific name is *Tryphæna pronuba*.)

Obs.—The beautiful, but not uncommon variety represented in the lower figure, I have been used to call *Innuba*, and it is described under that name by Stephens, but this seems to be an error, for Guenée describes that variety as having the costal margin and collar concolorous with the upper wings, whereas in the *Innuba* of English entomologists these parts are so much paler as to present a striking contrast.



551. The Autumnal Rustic (*Noctua glareosa*).

551. THE AUTUMNAL RUSTIC.—The palpi are porrected, but not very prominent; the antennæ are slightly serrated in the male, simple in the female: the colour of the fore wings is dove-coloured gray, with three rich brown markings; the first double and almost at the base of the wing, the second precedes the orbicular spot, and the third precedes the reniform; but neither of these discoidal spots is conspicuous: the three dark markings approach, but do not touch, the costal margin: the hind wings are white in the male, gray in the female; the head, thorax, and body are dove-coloured.

The CATERPILLAR is stout and velvety; the head is small and glabrous. The colour of the head is testaceous-brown, with two darker lines down the face; that of the body wainscot-brown, with a narrow medio-dorsal stripe, slightly paler, and bordered on each side with a rather darker tint; there are many black dots on the dorsal surface, four of these being ranged in a transverse series on the second, third, and fourth segments respectively; on the fifth and following segments they form a quadrangle; in the young caterpillar there is a lateral stripe of bright yellow, just below the spiracles, which are black, but this yellow stripe becomes gradually indistinct as the caterpillar grows, until when full-fed it has almost disappeared: the ventral is paler than the dorsal surface; the claspers are small and concolorous. It feeds principally on the common broom (*Spartium*), but sometimes eats dock and sorrel (*Rumex*).

The MOTH appears on the wing in September,

and occurs in most of our English and Scotch counties, beginning in Cornwall and Devonshire, and extending northwards, even to Sutherland and Caithness, and Mr. Birchall says it is widely distributed and common in Ireland. (The scientific name is *Noctua glareosa.*)



552. The Plain Clay (*Noctua depuncta*).

552. THE PLAIN CLAY.—The palpi are distant, porrected and spreading; the antennæ are very slightly incrassated in the male, extremely slender and thread-like in the female: the colour of the fore wings is ochreous-gray, with two dark brown markings, the first double and near the base of the wing; the second triple, its three component parts being arranged transversely; the usual discoidal spots have a very slender pale circumscription, but are generally quite distinct, and between them is a darker shade, beyond the reniform is a slender double line, then a series of dots, and then a broader waved line, parallel with the hind margin: the hind wings are grayish-brown, paler at the base: the head, thorax, and body are ochreous-gray.

"The CATERPILLAR is grayish-brown; the sub-dorsal line whitish, with a row of black dots; the spiracles are white in black rings (*Hub.*). On sorrel and other low plants." (*Stainton's Manual*, vol. i. p. 234.)

The MOTH appears on the wing in July, and may be described as local and rare. Mr. Reading gives Yealmpton, Harford Bridge, Exeter, and Alphington as western localities; Mr. Horton has taken it at Worcester; it has also been obtained in the northern English counties, and in Kirkcudbrightshire in Scotland, but not hitherto in Ireland. (The scientific name is *Noctua depuncta*.)



553. The Double Dart (*Noctua augur*).

553. THE DOUBLE DART.—The palpi are curved, projecting, and ascending; the antennæ are stout in the male, slender in the female: the fore wings are gray-brown and very dull; the orbicular has the lower border, the reniform the interior and exterior borders strongly outlined with black; there are two transverse zigzag black lines, the first before the orbicular, the second beyond the reniform: the hind wings, head, thorax, and body are gray-brown.

The EGG is laid in June, and hatched in June or July. The CATERPILLAR hybernates early. In the spring it again begins to feed on whitethorn (*Cratægus oxyacantha*), sallow (*Salix caprea*), and other shrubs. When full-fed, which is usually at the end of May, it rests in a straight position, but falls off its food-plant and rolls in a ring when disturbed. The head is of much less circumference than the body, semi-porrected, and slightly notched on the crown: in moving, the head is stretched forward, and moves about in a very leech-like manner. The body is cylindrical, slightly attenuated towards the head, and slightly incrassated dorsally on the twelfth segment. The head is very shining, pale pellucid brown, reticulated and variegated with darker. The body is excessively smooth, dull purplish-brown, with several darker markings, more particularly a narrow waved rich brown stripe along each side, including the spiracles; there is a transverse mark of the same colour, dilated at each extremity, on the twelfth segment; on various parts of the back there are also small round white spots, two on the anterior part of each segment, beginning with the third, and two rather less distinct on the posterior part; the belly, claspers, and legs are pale

and semi-transparent. It changes to a CHRYSALIS on or near the surface of the ground.

The MOTH appears on the wing in July, and is common in England, Scotland, and Ireland. (The scientific name is *Noctua augur*.)



554. The Flame Shoulder (*Noctua plecta*).

554. THE FLAME SHOULDER.—The palpi are porrected and conspicuous, the third joint small, and received into the second as into a cup; the antennæ of the male are delicately ciliated, those of the female simple: the colour of the fore wings is vinous-brown, with the costal margin broadly white from the base to beyond the reniform spot; the white colour is impure; there is a dash of the same colour at the base of the inner margin; both the discoidal spots are distinctly outlined in gray, and both are united with the costal white; a streak of purer white extends from the base of the wing to the orbicular, and below this, immediately adjoining it, is a blackish shade: the hind wings are white; the head and collar are pale, the square disk of the thorax is vinous-brown; the body pale wainscot-brown.

The EGGS, kindly given me by Mr. Moncreaff, were laid in a chip box, and were hatched in June; and the CATERPILLARS, which fed on ladies' bed-straw (*Galium verum*) and sweet woodruff (*Asperula odorata*), were full-fed on the 26th of July. The caterpillar rolls itself in a compact ring when annoyed. The head is glabrous, very shining, narrower than the second segment, and especially narrower than the rest of the body, porrected in crawling, and not notched on the crown; the body is smooth and velvety, gradually but slightly increasing in width from the second to the eleventh segment, which is wider. The twelfth is rather abruptly truncate: the colour of the head is umber-brown, with a pale longitudinal patch on each cheek; the dorsal surface of the body is umber-brown; the medio-dorsal stripe rather darker, narrow, and intersected by a slender interrupted white line; there is an upper lateral stripe, darker, half-way between the medio-dorsal stripe and the spiracles; this is also intersected by a slender interrupted whitish line; the lower margin of the dorsal surface is darker; the ventral is paler than the dorsal area, particularly at the junction of the two areas, where it may be called a pale lateral stripe; all parts of the body are reticulated and dotted with dark brown; the legs, feet, and claspers are of the same dingy colour as the body.

The MOTH appears on the wing in July, and is generally common throughout England, Scotland, and Ireland. (The scientific name is *Noctua plecta*.)



555. The Black Collar (*Noctua flammatra*).

555. THE BLACK COLLAR.—The palpi are porrected, rather connivent towards the tip, and blunt; the antennæ are rather long and slightly serrated: the fore wings are rather narrow, the costa very straight, the hind margin rather rounded, and slightly waved; their colour is grayish-brown with a somewhat silky appearance, and having a black linear mark issuing from the middle of the base, and extending rather more than a sixth of the length of the wing; beyond this, and rather higher on the wing, is a second black mark almost linear, and yet obscurely and obtusely pyramidal in outline; there are other markings on the fore wings both darker and paler than the ground colour, but these are so obscure—the specimen being somewhat wasted—that I cannot describe them with any certainty: the

hind wings are slightly paler, but of the same prevailing tint as the fore wings: the head, thorax, and body are grayish-brown, with a tendency to dove-colour; and there is a most conspicuous transverse black mark on the front of the thorax immediately behind the neck: this very striking mark is convex in front, nearly straight behind, very pointed at the two extremities, and divided by a slender median line.

"The CATERPILLAR is unknown except through Treitschke's very unsatisfactory description."—*Guenée.*

The MOTH appears on the wing in July, and is only known as British through the capture of a single specimen by Mr. Bond in the Isle of Wight. With his usual kindness, Mr. Bond has lent me this specimen for figuring and describing in this work. (The scientific name is *Noctua flammatra.*)



556. The Setaceous Hebrew Character (*Noctua C-nigrum*).

556. THE SETACEOUS HEBREW CHARACTER.—The palpi are porrected and prominent; the antennæ are simple: the colour of the fore wings is a rich bistre-brown, the orbicular spot large, conspicuous, whitish, and obscurely triangular, the base or broadest side of the triangle being towards the costal margin; the reniform is less in size and less distinct; it is of the usual form; on the costa, near the tip, is a blackish spot, and the tip itself is rather gray: the hind wings are pale gray-brown: the head and thorax are dark brown, the body pale brown.

The CATERPILLAR is greenish-gray, with a yellowish dorsal stripe, pale green sub-dorsal stripe, and white spiracular stripe, the space between the two last stripes being dark green (*Hubner*). On various low plants. (*Stainton's Manual*, vol. i. p. 234.)

This species is double-brooded, the MOTHS of the first brood appearing on the wing in May and June, and those of the second brood in August and September. It is generally distributed in England, Ireland, and Scotland. (The scientific name is *Noctua C-nigrum.*)



557. The Triple-Spotted Clay (*Noctua ditrapezium*).

557. THE TRIPLE-SPOTTED CLAY.—The antennæ are simple in both sexes: the fore wings are rather narrow; their colour is rich umber-brown, tinged with red; a very dark shade extends from the base to beyond the reniform, ascending to the sub-costal ray on both sides of the orbicular; there is a distinct dark brown, almost black, spot seated on the costa, near the tip of the wing: the hind wings and body are gray-brown tinged with saffron reflections; the head and thorax are darker.

The CATERPILLAR is grayish-ochreous, with a slight reddish tinge, with darker marks along the back, most conspicuous on the eleventh and twelfth segments. (*Hubner.*) On various low plants. (*Stainton's Manual*, vol. i. p. 235.)

The MOTH appears on the wing in July, and has been taken in Cornwall; in Devonshire, between Plymbridge and Bickleigh, at Barnstaple, Devonport, Torquay, and Lee Moor; in Dorsetshire; in Hampshire, in the New Forest; in the Isle of Wight, Sussex, and at Birch Wood, in Kent, but I think not in Scotland: Mr. Birchall informs us he took a pair at sugar, near Galway, in July, 1857. (The scientific name is *Noctua ditrapezium.*)



558. The Double-Spotted Square-Spot (*Noctua triangulum*).

558. THE DOUBLE-SPOTTED SQUARE-SPOT.—The palpi are porrected, the scales of the second joint projecting beyond the first, which is small and short; the antennæ are simple: the colour of the fore wings is grayish-brown, with several dark and well-defined markings; there is a short transverse line at the base, with a dark spot at its lower extremity; the orbicular and reniform are outlined with pale gray, but have lost their characteristic form; the orbicular is pale, and ascends to the costal margin, and, except on the margin, is surrounded with dark brown, which forms a square spot between the orbicular and reniform; there is a very strongly pronounced dark brown spot on the costa near the tip of the wing: the hind wings, head, thorax, and body are gray-brown.

The CATERPILLAR rolls in a ring when annoyed; the head is narrower than the second segment, into which it is partially received; the body is attenuated anteriorly; the twelfth segment is slightly elevated, the thirteenth rounded, the anal claspers extended beyond it; the colour of the head and body is pale dingy-brown, delicately reticulated with black; there are two dorsal series of oblique oblong markings, commencing on the fifth segment and extending to the twelfth; those on the twelfth segment are almost united posteriorly; the others are perfectly distinct; each marking is accompanied and almost surrounded by a paler area, there is also a thread-like medio-dorsal paler stripe; on each segment is a transverse series of black dots, and the spiracles are of a deeper black; the legs and claspers are concolorous with the body. Early in May the caterpillars bury themselves in the ground, and there turn to CHRYSALIDS.

The MOTH appears on the wing in June, and has been taken freely in most of our English counties, from Cornwall to York; Mr. Douglas Robinson reports it from Kirkcudbrightshire, and Mr. Birchall says it is common in most localities in Ireland. (The scientific name is *Noctua triangulum.*)



559. The Square-Spotted Clay (*Noctua rhomboidea*).

559. THE SQUARE-SPOTTED CLAY.—The palpi are porrected, the second joint being rather long and rather slender; the antennæ are simple: tho colour of the fore wings is very dark brown, all the markings being obscure from their general similarity to the ground colour; the orbicular and reniform are delicately outlined with ochreous gray; the space before and beyond the orbicular is intensely dark; there is an obscure darker band parallel with the hind margin, the outer boundary of which is waved and delicately outlined with ochreous gray: the hind wings are gray-brown with a slight gloss; the head and thorax are dark brown; the body gray-brown.

The EGG is laid on chickweed (*Stellaria media*) and other low plants, at the roots of which the CATERPILLAR hybernates when small; in the spring it feeds on chickweed, dock, &c., but also ascends sallows (*Salix caprea*), and feeds on the young leaves; it is very generally full-fed about the end of May or beginning of June: the head is almost prone, rather small, generally half-concealed in the second segment; the body is smooth, velvety, almost uniformly cylindrical, but having the second, third, and fourth segments more slender than those which follow; the

crown of the head is brown and shining; the body has the dorsal area as far as the spiracles brown, but the tint of the brown is different in different individuals, approaching sometimes to sepia, sometimes to sienna-brown: this brown area is divided by three equidistant narrow stripes, of a pale greenish hue, and these three equidistant narrow stripes are connected on the twelfth segment by a transverse bar of the same colour; the back has several black markings, almost taking the character of dots; the belly below the spiracles is pale olive-green.

The MOTH appears on the wing in July, and seems to be confined to the Southern counties of England, as Darent Wood in Kent, West Wickham in Surrey, Essex, Hertfordshire, Isle of Wight, Berkshire, and Oxfordshire. (The scientific name is (*Noctua rhomboidea.*)

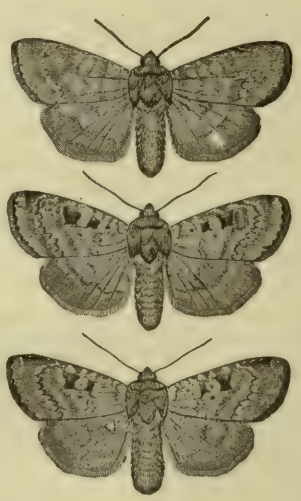


560. The Purple Clay (*Noctua brunnea*).

560. THE PURPLE CLAY.—The palpi are porrected, pointed, distant, and of a rich red-brown colour; the antennæ are simple; the colour of the fore wings is richly marbled with several shades of brown; the reniform is ochreous-white, and very conspicuous: the orbicular is purplish-gray, subtriangular, and very indistinct; there is an indication of two transverse bands, rather darker than the ground colour; the first is between the discoidal spots, the second beyond the reniform; both these are rather dark towards the costal but very faint towards the inner margin; there are several ochreous spots on the costa: the hind wings are dull gray-brown, a crescentic discoidal spot, the wing-rays, and the extreme hind margin being darker, and the fringe testaceous-brown; the head and thorax are rich dark brown; the body is dingy brown, its extremity tufted and testaceous-brown.

The CATERPILLAR feeds on sallow, and is full-fed at the end of April. It rolls in a compact ring when annoyed. The head is very much narrower than the body; the body is velvety, attenuated anteriorly; the twelfth segment is very stout; the thirteenth rounded; the colour of the head is pale brown, shining, with a dark longitudinal line on each side the commissure; the body is dingy olive-brown, with two transversely placed, and somewhat triangular, marks on the back of the eleventh and twelfth segments, the apex of the triangles pointing forwards, and much attenuated; there is a darker stripe along each side, enclosing the white spiracles, and behind each spiracle is a black spot; each segment has a transverse series of minute black dots; the legs and claspers are concolorous; it changes to a glabrous brown CHRYSALIS beneath the surface of the ground, and enclosed in a very slight web.

The MOTH appears on the wing the first week in July, and occurs throughout England, Scotland, and Ireland. (The scientific name is *Noctua brunnea.*)



561. The Ingrailed Clay (*Noctua festiva*).

561. THE INGRAILED CLAY.—The palpi are rather long and distant, the terminal joint long and slender, but rarely exceeding the scales of the second in length; the antennæ are simple:

the fore wings are rather squarely pointed at the tip, their colour is obscure ochreous-gray, clouded with various shades of brown; the orbicular is gray, the reniform only outlined with gray, and its median area of the same colour as the general area of the wing; adjoining the orbicular is a dark brown triangular spot, the apex of which points to the base of the wing, and between the two discoidal spots is a dark brown square spot; on the extreme hind margin is a series of minute black spots, each situated at the extremity of a wing-ray: the hind wings are gray-brown, with a darker crescentic discoidal spot and a pale testaceous fringe: the head and collar are pale wainscot-brown, the thorax testaceous-brown; the body gray at the base, gray-brown in the middle, and bright testaceous-brown at the extremity.

The CATERPILLAR rolls in a lax ring if annoyed, the head being brought into contact with the ventral claspers: the head is glabrous, of about the same width as the second segment, and prone, the cheeks rounded, and there is scarcely any notch on the crown; the body is uniformly cylindrical, smooth, and velvety; the colour of the head is pale ferruginous, reticulated with darker brown, and having black ocelli and several other black dots; the colour of the body is dull ferruginous, reticulated and dotted with darker brown; all the markings are very minute; there is a very narrow medio-dorsal thread-like stripe extending from behind the head to the anal extremity, a transverse line on the twelfth, and another on the thirteenth segment; the anterior portion of these is dark brown, the posterior portion nearly white; on each side of the medio-dorsal stripe is a series of whitish spots; the spiracles are nearly white, with a small black blotch behind each; the ventral surface, extending to the spiracles, is paler than the dorsal surface, and there is an appearance of a still paler lateral stripe, which partially includes the spiracles, but is chiefly below them; the legs and claspers are very pale. It feeds on sallow, and my specimens were full-fed on the 6th of May, and retired beneath the surface of the earth to undergo pupation.

The MOTH appears on the wing in July, and is common in England, Scotland, and Ireland. (The scientific name is *Noctua festiva*.)

Obs.—This MOTH is exceedingly variable. Through the kindness of friends I have at times possessed hundreds of specimens, of which I can truly say that no two were exactly alike. The figures represent some of the more common varieties.



562. The Lesser Ingrailed (*Noctua conflua*).

562. THE LESSER INGRAILED.—The palpi are rather long and distant; the terminal joint is long and slender, but rarely exceeding the scales of the second in length; the antennæ are simple: the fore wings are rather squarely pointed at the tip; their colour is dingy gray, with scarcely any tint of ochreous, but clouted with various tints of gray and brown; the orbicular is gray, the reniform only outlined with gray; between these two discoidal spots is a very dark square spot or space; and on the extreme hind margin is a series of small linear black marks; the hind wings are gray-brown, much darker towards the margin, and having a crescentic discoidal spot and a pale fringe of a testaceous-red colour: the head, thorax, and body are dingy brown, the last paler at the base and tip.

The EGGS are laid in July on various low plants. The CATERPILLAR is polyphagous, but prefers the leaves of the moss campion (*Silene*

acaulis). The head is small and almost spherical; the body rather obese, smooth, and having the twelfth segment slightly tumid dorsally. The colour of the head is pale brown, the face having two conspicuous crescentic black markings placed back to back, that is, with the convexity of each towards the median suture: the colour of the dorsal area of the body is greenish-yellow, delicately striated with brown. Like the caterpillars of many other true *Noctuæ*, it is marked from the fourth segment to the tenth, both inclusive, with a sub-dorsal stripe surmonted on each segment with a wedge-shaped black spot, the apex of which points towards the head of the caterpillar; the medio-dorsal stripe is straight, nearly white, and delicately bordered on each side with brown: it is scarcely perceptible on the middle segments. The spiracular stripe is indicated by a series of straight brown markings: the spiracles are oval, black, and encircled with white: the ventral is paler than the dorsal area, and has no markings: the feet are testaceous, the extremities black: the claspers are concolorous with the ventral area, except at the extremities, which are brown. In the autumn this caterpillar hybernates towards the roots of herbage, feeding again in May for a short time; when full-fed it again descends towards the ground, and, secreting itself among fragments of its food-plant, spins a cocoon of these materials, mixed with particles of earth: in this it almost immediately changes to a CHRYSALIS, which is of moderate length and ordinary form, and rather glabrous brown, with a black tip to the body, which is furnished with four straight, but rather spreading, spine-like bristles: of these the outer one on each side is only half the length of the other.

The MOTH appears on the wing in June, and is abundant on the heaths or mosses near Darlington, as also in similar localities in Perthshire, and Mr. C. Buxton has taken it in the north of Scotland, but it is evidently very local. (The scientific name is *Noctua conflua.*)

Obs. 1.—This pretty little species strikes me as very like *Festiva* in miniature, but our best continental lepidopterists have not noticed this similarity. I am indebted to Mr. Backhouse, of Wolsingham, for my own series, and for a hundred specimens for distribution, none of them exceeding in size the three which I have figured. The total difference of the two caterpillars proves the two species to be perfectly distinct.

Obs. 2.—I am indebted to M. Millière's beautiful work for a description of the caterpillar and chrysalis.



563. The Barred Chestnut (*Noctua Dahlii*).

563. THE BARRED CHESTNUT.—The palpi are porrected and rather long; the second joint has very long scales, particularly on the under side, and these project as far as the naked apical joint; the antennæ are slightly ciliated in the male, simple in the female: the costal margin of the fore wings is arched, their colour is dull chestnut-brown, lined and clouted with darker brown; the discoidal spots are scarcely distinguishable from the ground colour, but are always traceable; there is always a small oblique black spot below the orbicular; a median shade crosses the wing between the discoidal spots, but this is neither very conspicuous nor very constant: the hind wings are gray-brown, paler at the base; the fringe is pale, and inclining to rosy.

The CATERPILLAR is reddish mixed with gray, with paler dorsal and subdorsal lines; above the latter is a row of black dots in white rings (*Hubner*). On various low plants. (*Stainton's Manual*, vol. i, p. 236.)

The MOTH appears on the wing in July and August. It has been taken both in the north and south of England; Mr. Reading reports it from various localities in Devonshire, as Plymbridge, Shaugh Woods, Radford Wood, Torquay, Exeter, and Stoke Wood; he says it frequents open places in woods, where at dusk it is easily captured on the wing; it also

occurs in the New Forest in Hampshire, in the Isle of Wight, in Sussex, Kent, Surrey, Derbyshire, Lancashire, and Yorkshire; also at Howth and Killarney, in Ireland. (The scientific name is *Noctua Dahlii.*)



564. The Rosy Marsh (*Noctua subrosea*).

564. THE ROSY MARSH.—The palpi are porrected and rather long; the antennæ are strongly pectinated in the male, simple in the female: the fore wings are slightly arched on the costal margin; their colour is gray with a tint of red, and very glossy; both the discoidal spots are paler, and the space between them darker than the general area; there are also a darker cloud before the orbicular, a zigzag line beyond this, and a narrow bar again beyond this; there are three black spots on the costa; that nearest the tip commences the dark bar: the hind wings are whitish wainscot brown, with a strongly marked discoidal spot, a transverse bar near the hind margin, and the wing-rays darker: the head and thorax are of the same colour as the fore wings, the body the same colour as the hind wings.

The CATERPILLAR is very beautiful, of a bright reddish-gray colour, lined and marbled with brown, and having broad medio-dorsal and sub-dorsal stripes, clearly defined, continuous and straight, of a citron-yellow bordered with brown; there is another very broad stripe in the neighbourhood of the spiracles of a sulphur-yellow, and this precedes a ventral band of dark brown; the spiracles are brown; the head has two brown lines: it feeds on the sweet gale (*Myrica gale*), in May and June.

The MOTH appears on the wing in July, and has occurred in Huntingdonshire and Cambridgeshire. It has not been taken in Britain for many years. (The scientific name is *Noctua subrosea.*)

Obs.—I am indebted to Guenée's work for a description of the caterpillar, for although my kind friend Mr. Doubleday once possessed the caterpillars in abundance, I did not avail myself of the opportunity of describing them.



565. The Small Square-Spot (*Noctua Rubi*).

565. THE SMALL SQUARE-SPOT.—The palpi are porrected and scaly; the antennæ nearly simple in the male, quite so in the female: the costal margin of the fore wings is nearly straight: their colour is reddish-brown, with several transverse darker lines; the discoidal spots are distinctly outlined in gray, the reniform being particularly conspicuous; there is a distinct black spot below the orbicular, and a dark cloud between the discoidal spots; beyond the reniform, and parallel with the hind margin, are two distinct transverse lines, the outer portion of each being dark, the inner portion pale: the hind wings are pale gray-brown, tinged with reddish, and having a pale reddish fringe; the discoidal spot is darker: the head, thorax, and body are reddish-brown.

"The CATERPILLAR is greenish-gray, with darker-edged white dorsal line; spiracular line pale greenish-ochreous, edged above with darker, with faint indication of lateral oblique stripes along the sub-dorsal line. On various low plants." (*Stainton's Manual*, vol. i. p. 236.)

This species is regularly double-brooded, the MOTH appearing on the wing in May and August: it is generally distributed over England; it has been taken in Scotland; and Mr. Birchall says it is common at Howth, in Ireland. (The scientific name is *Noctua Rubi.*)



566. The Six-Striped Rustic (*Noctua umbrosa*).

566. THE SIX-STRIPED RUSTIC.—The palpi are porrected, the second joint square at the tip, and the small naked apical joint standing out distinct; the antennæ are slightly serrated in the male; the colour of the fore wings is reddish-gray, with three dark transverse lines, the first is very short and close to the base of the wing; the second is zigzag, and precedes the orbicular; the third is beyond the reniform; both discoidal spots are clearly defined in outline, but their median area is concolorous with the rest of the wing; a dark shade crosses the wing between the orbicular and reniform, and another beyond the third line and parallel with the hind margin: the hind wings are gray-brown, the fringe paler, and tinged with red: the head and thorax are reddish-gray; the body paler.

The CATERPILLAR is very imperfectly known, as Guenée well observes; it is said to feed on grass; but Guenée thinks it probable that collectors have confounded it with that of *Noctua xanthographa*. Mr. Stainton, on the authority of Treitschke, says it is whitish-gray, with black sub-dorsal lines.

The MOTH appears on the wing in August, and has been taken in most of our English counties, and also in Scotland, and Mr. Birchall says it is common in most places in Ireland. (The scientific name is *Noctua umbrosa*.)



567. The Dotted Clay (*Noctua baja*).

567. THE DOTTED CLAY.—The palpi are porrected, the summit of the second joint cut off obliquely, and its scales extending beyond the third, which is small and naked, the basal portion of the palpi, extending almost to the tip of the second joint, is rich umber-brown, but the tip of that joint, as well as the whole of the apical joint, is pale brown; the antennæ are very slightly serrated in the male, simple in the female: the colour of the fore wings is reddish-brown; the orbicular is outlined in gray, its median area being concolorous with the ground colour; the reniform is also outlined in gray, but its median area is not entirely of the ground colour, the lower half being dark gray-brown; there is a transverse median shade passing between the discoidal spots, and a transversely elongate dark brown spot on the costa near the tip; these are the more obvious markings: the hind wings are reddish-brown, inclining to gray on the disk, and to gray-brown on the hind margin; the fringe is pale testaceous-brown; the head is pale gray-brown; the front of the thorax testaceous-brown, its disk darker brown; the body is ferruginous-brown, reddish towards the extremity.

The CATERPILLAR is yellow-ochreous, marbled with brownish, with yellowish dorsal line edged with black: yellowish sub-dorsal line, from which, on the fifth to the twelfth segment, an oblique yellow streak proceeds to the middle of the back (*Hubner*). On various low plants. (*Stainton's Manual*, vol. i. p 237.)

The MOTH appears on the wing in July, and is generally common in England, Scotland, and Ireland. (The scientific name is *Noctua baja*.)



568. The Cousin-German (*Noctua sobrina*).

568. THE COUSIN-GERMAN.—The palpi are but slightly porrected; the terminal joint is naked and pointed; the antennæ are very

slightly serrated in the male, quite simple in the female: the colour of the fore wings is grayish-brown, with a tinge of purple; the orbicular is outlined with pale gray, it is rather oblique and somewhat reniform; the reniform is very indistinct; there is a short and incomplete transverse line near the base, a complete line before the orbicular, a transverse shade before the reniform, a transverse zigzag dark line beyond the reniform, and a pale gray transverse line parallel with the hind margin: the hind wings are gray-brown, paler at the base, and exhibiting a trace of the crescentic discoidal spot: the head, thorax, and body are purplish-brown.

The CATERPILLAR, according to Guenée, a good deal resembles those of *Cerastis Vaccinii* and *C. erythrocephala;* it is of a violet or vinous-gray colour, delicately marbled with yellowish white, and having the medio-dorsal and sub-dorsal stripes very conspicuous, but broken up into spots of a dull ochreous-yellow colour; there is a side stripe in the region of the spiracles, rather paler than the ground colour, this is abruptly bounded on its upper border, but on its lower border is fused with the colour of the ventral area; above this are the spiracles, each situated in a very conspicuous black dot: the head and legs are concolorous; the caterpillar, in its younger stages, very much resembles that of *Noctua baja;* it is of a dark blackish-brown colour, and is marked at each division of the segment with a white spot: its food-plant is entirely unknown.

The MOTH has been taken in July at Rannoch, in Perthshire, but I know of no other British locality. (The scientific name is *Noctua sobrina.*)

Obs. With regard to this and other rarities, the attempt to collect them all with one's own hand is quite hopeless: a perfect collection can only be obtained by an extensive correspondence with those of similar pursuits; and this can only be attained through the medium of the *Entomologist*, where long lists of duplicates are published every month for exchange or gratuitous distribution. The *Entomologist* is published by Messrs. Simpkin, Marshall, & Co., at sixpence.



569. The Gray Rustic (*Noctua neglecta*).

569. THE GRAY RUSTIC.—The palpi are porrected, the second joint obliquely truncate, the terminal joint small and naked, and not extending so far as the scales of the second; the antennæ are very slightly serrated in the male, quite simple in the female: the colour of the fore wings varies from ochreous-gray to brickdust-red; the circumscription of the discoidal spots is most delicately outlined with testaceous brown; the median area of the orbicular is concolorous with the general area of the wing, but in the reniform it is smoky at the lower extremity; the other markings are extremely indistinct: the hind wings are gray-brown, pale at the base, and having a paler fringe inclining to red; the head and thorax are of the same colour as the fore wings, the body of the same colour as the hind wings.

The CATERPILLAR rolls in a ring and falls off its food-plant, feigning death, when disturbed. It crawls very actively, often moving the anterior part of the body in the manner of a leech. The head is rather small, and shining; the body uniformly cylindrical, and velvety. The colour, including the head, is uniform dull brown or uniform pale green, in both instances having a very slender and very obscure pale medio-dorsal stripe, and a very distinct broader white stripe on each side immediately below the spiracles. The dorsal region is thickly dotted or reticulated with a darker colour. It feeds in the night-time on the common ling (*Calluna vulgaris*), and is full fed at the end of May; it then

enters the earth to undergo its change to a CHRYSALIS.

The MOTH appears on the wing in August, always frequenting heaths. In such situations it is common in Cornwall and Devonshire, in which county Mr. Reading gives Ivybridge, Ugborough Beacon, Shaugh Downs, St. Clear Downs, Whitsand Heights, Torquay, and Exeter, as localities; Somerset, Wilts, Dorset, Hampshire (in the New Forest), Sussex, Kent, and Surrey, at West Wickham; and is also reported from two northern counties, Lancashire and Yorkshire; it is common at Rannoch, in Scotland; and Mr. Birchall found it at Galway. (The scientific name is *Noctua neglecta.*)



570. The Square-spot Rustic (*Noctua xanthographa*).

570. THE SQUARE-SPOT RUSTIC.—The palpi are porrected, the apical joint naked and distinct; the antennæ are slightly serrated in the male, quite simple in the female; the fore wings are short, the hind margin unusually rounded; their colour is gray-brown, tinged either with ochreous-brown, brickdust-red, or umber-brown; the discoidal spots are generally very distinct and decidedly paler, being of an ochreous-gray tint; in some their median area is exactly concolorous with the general area of the wing: the hind wings are pale gray-brown, with a dark brown hind-marginal band; the fringe is paler; the head and thorax are of the same colour as the fore wings, the base of the body is pale gray-brown, but beyond the middle it is darker brown.

The EGGS are laid in August and September, on various species of grass, which constitute the food of the CATERPILLAR; it retires towards the roots when very small, secreting itself under any covering that will protect it from the weather: at this season, and again in the spring, after it has recommenced feeding, it is very fond of hiding on the under surface of stones, if such occur near its dwelling-place. The full-fed caterpillar drops from its food-plant when annoyed, and rolls itself into a very tight and compact ring, but quickly unrolls when the danger is passed, and crawls with considerable activity. The head is manifestly narrower than the second segment; the body is obese, almost uniformly cylindrical, but still increasing very gradually from the second to the twelfth segment; the colour of the head is pale semi-transparent brown, very glabrous, with two slightly curved longitudinal dark stripes on the face, and the cheeks are slightly reticulated with the same colour; the body is pale velvety-brown, with a narrow medio-dorsal stripe still paler, and margined on each side with black, which shades off externally into the pale-brown ground-colour; this black, however, consists of innumerable minute specks, which are crowded when in close proximity to the pale medio-dorsal stripe, but become scattered as they recede from it; just above the spiracles is a rather broad lateral stripe, somewhat darker than the ground-colour, and having a dark but ill-defined upper margin, and a unicolorous and clearly defined lower margin; exactly intermediate between the medio-dorsal stripe and this lateral stripe, is a particoloured stripe, scarcely so wide as the latter; it is divided longitudinally into two equal parts, the upper part very dark brown, almost black, and somewhat interrupted at the interstices of the segments (thus forming a series of eleven elongate blotches), the lower part pale, and throwing the series of blotches into bold relief; three pale stripes are also to be traced on the second segment; the legs, claspers, and belly are pale, and have a semi-transparent appearance. It enters the ground in May, but never changes to a CHRYSALIS until the middle of July, and sometimes not before August. The chrysalis is shining and brown: that state generally lasts about three weeks.

The MOTH appears on the wing in July and August, and is equally abundant in England,

Scotland, and Ireland. (The scientific name is *Noctua xanthographa.*)

Obs. This moth is sometimes a perfect nuisance to the collector who adopts the sugaring mode of capture. Guenée observes that a great number of individuals die in the chrysalis state,—a conclusion at which he arrives from the fact that in France the caterpillars are much more abundant than the moth. Mr. Doubleday informs me he thinks this is also the case in England.



571. The Pine Beauty (*Trachea piniperda*).

571. THE PINE BEAUTY.—The palpi are small, short and inconspicuous; they are clothed with longish scales, which conceal their form: the antennæ of the male are serrated, the teeth being very short; those of the female are simple; the head is very small and almost hidden by the clothing of the thorax: the fore wings are rather long and narrow, and of a bright reddish-brown colour, mixed with orange; the orbicular is small, the reniform large and oblique; both are outlined in white, and both are cut off at the lower extremity by a white wing-ray, which emits a branch below the orbicular; the hind marginal area is occupied by a broad band of ochreous-yellow, which contains eight oblong and closely approximate red spots: the hind wings are gray-brown, the inner margin paler; the fringe is yellowish-red: the head is yellowish, the thorax gaily ornamented with red, orange, and white; the body is brown at the base, reddish towards the tip.

The CATERPILLAR rests in a straight position on the twigs of fir-trees, but when knocked off rolls in a compact ring; the head is rather narrower than the second segment; the body is obese, but decidedly tapering to the anal extremity: the colour of the head is pale wainscot-brown, of the body clear pale brown, or dark olive-green, or rich oil-green, varying in different specimens, and has five longitudinal white stripes, one of which is medio-dorsal; the next is lateral, and accompanied, or rather bordered, on each side by a very delicate jet-black line; the next is in the region of the spiracles, and is accompanied by a bright orange stripe; the ventral is rather paler than the dorsal area, and the claspers are concolorous; on all parts of the body are scattered black dots, but I find no order in their arrangement; the legs, like the head, are wainscot-brown. It feeds on the needles of the Scotch fir, beginning at the tip and eating slowly and systematically to the base; it is full fed during the first or second week in July, when it forms a very flimsy cocoon in the crevices of the bark, and therein turns to a slender and sharp-tailed reddish CHRYSALIS.

The MOTH appears in April, when it may be found just emerged from the chrysalis case and sticking close to the back of the fir, with which, although so variegated, it strikingly assimilates in colour. It is found only in pine plantations, but is generally present both in England and Scotland where these occur: it has not been observed in Ireland. (The scientific name is *Trachea piniperda.*)

Obs. M. Guenée describes the chrysalis as *enterrés*, and I have no doubt this is correct as a rule, but it is contrary to my very limited experience.



572. The Mountain Rustic (*Pachnobia carnica*).

572. THE MOUNTAIN RUSTIC.—The palpi are short and porrected, the second joint rather slender, the apical joint distinct and naked; the antennæ are serrated in the male, the serratures being short and inconspicuous, simple in the female; the fore wings are rather pointed at the tip; their colour is dingy gray, the exterior portion of the wing

being more inclined to brown; the orbicular spot is very indistinctly defined, and unites with a costal blotch similar in its gray tint; the reniform is distinct, its outline well defined and pale, its median area rather dark brown; the space between the discoidal spots is dark brown, and between the orbicular and the base of the wing there is a conspicuous brown mark, which encloses a square pale costal spot; there is a dark but vague spot near the base of the wing, an angled line between the orbicular and the inner margin, and a zigzag line beyond the reniform; the hind-marginal area is pale, interrupted by a series of six or seven dark oblong spots; on the hind margin itself is a series of linear black spots: the hind wings are grayish-brown, paler at the base, and having a hind-marginal series of dark linear spots; the head, thorax, and body are gray-brown.

The MOTH appears on the wing in August. Mr. Douglas took a single specimen on Cairn Gower, in Perthshire, and the late James Foxcroft a second, also in Scotland; the latter is in the rich cabinet of Mr. Bond, and has been most kindly lent me to describe and figure in this work. (The scientific name is *Pachnobia carnica.*)



573. The Hebrew Character (*Tæniocampa gothica*).

573. THE HEBREW CHARACTER.—The palpi are small, slightly porrected, and very inconspicuous; the second joint is slender, and very dark brown below; the third short, slender, and very pale; the antennæ are pectinated in the male, simple in the female: the colour of the fore wings is purple-brown, more or less tinged with gray; the scales seem to stand erect; the orbicular spot is incomplete at the top, and the reniform at the bottom; both are circumscribed, where complete, with a slender pale line, and the inclosed area is gray; the space between the discoidal spots, and around the orbicular, except on its upper side, is dark brown; half way between the reniform and the inner margin is a short, dark line; near the base of the wing, and extending half-way across it, is a narrow transverse line, and there are three other narrow transverse lines, the first nearly direct, and situated before the orbicular; the second much curved, and situated beyond the reniform; and the third oblique, and parallel with the hind margin: just within this last is a transverse pale cloud, in general very conspicuous, but not reaching either the costal or inner margin: the hind wings are brownish-gray, with a slight indication of a crescentic discoidal spot; their fringe is pale and tinged with pink: the head, thorax, and body are gray-brown, often inclining to red, the scales are long, giving the thorax and body a woolly appearance.

The EGG is laid in the spring, and the CATERPILLAR feeds on sallow (*Salix caprea*), white-thorn (*Cratægus oxyacantha*), oak (*Quercus Robur*), and many other trees and shrubs. Mr. Doubleday has observed it feeding on laurel in his own garden. When full-fed, which is usually in June, it falls off the food-plant if annoyed, and feigns death, rolling itself into a compact ring, with the head on one side. The head is glabrous, and narrower than the body; the body is obese, uniformly cylindrical, and quite smooth. The colour of the head is pale transparent apple green, with black ocelli; of the body delicate apple-green, with a borad and very conspicuous stripe on each side, of a pale glaucous-green, approaching to white; this stripe commences immediately behind the head, and terminates in the anal claspers; it passes below the first and ninth spiracles, but includes all the rest, and is gradually attenuated towards both extremities: there is a very narrow pale yellow mediodorsal stripe; and exactly intermediate between this and the broad lateral stripe is another very narrow pale yellow stripe, less continuous and less distinct; there are numerous

minute yellow markings throughout the dorsal surface, in addition to the three narrow stripes I have mentioned; and along the upper margin of the brown lateral stripe the green is tinged with smoky-black. The belly, legs, and claspers are pale semi-transparent green. It buries itself in the earth, and changes to a CHRYSALIS about the middle of June.

The MOTH appears on the wing in March and April, frequenting the catkins of the sallow. It is generally distributed throughout the kingdom. (The scientific name is *Tæniocampa gothica.*)



574. The White-marked (*Tæniocampa leucographa*).

574. THE WHITE-MARKED.—The palpi are short, and slightly porrected, reddish-brown, tipped with pale brown; the antennæ are pectinated in the male, simple in the female; the fore wings are brickdust-red, inclining to gray-brown; the orbicular spot is pale gray, in some specimens almost white; the reniform is rather darker gray; two transverse series of dots, rather darker than the ground colour, cross the wing, the first before the orbicular, the second parallel with the hind margin; none of the markings, except the pale discoidal spots, are at all conspicuous: the hind wings are pale reddish-brown, and have a slightly transparent appearance; the fringe is inclined to pink; the head, thorax, and tip of the body are brickdust-red; the base of the body is gray.

"The CATERPILLAR is at present unknown, except through a description given by Treitschke after Rincken-Sommer, on the fidelity of which it would not do to place too much reliance. It is, therefore, much to be desired that our entomologists residing on the banks of the Rhine would supply us with exact figures and descriptions, which would decide whether I am right or wrong in placing the species in this genus."—*Guenée.*

The MOTH appears on the wing in March and April, frequenting the catkins of the sallow. It is rare and local, and has been taken at Lee Moor, Exeter, and Barnstaple, in Devonshire; in Somersetshire, by Mr. Crotch; in the Isle of Wight, Sussex, Suffolk, Yorkshire, and the Lake District. I have no records from Scotland or Ireland. (The scientific name is *Tæniocampa leucographa.*)



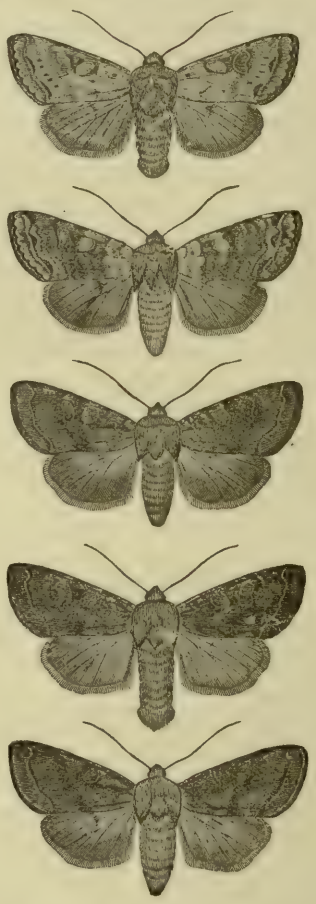
575. The Red Chestnut (*Tæniocampa rubricosa*).

575. THE RED CHESTNUT.—The palpi are very inconspicuous; the antennæ very slightly serrated in the male, simple in the female: the fore wings are brick-red, inclining to gray-brown; the discoidal spots are indistinct, the orbicular pale gray, the reniform outlined in pale gray, but filled up with gray-brown; three transverse pale gray lines cross the wing; the first, which is interrupted, is before the orbicular; the second, which is much bent, is beyond the reniform; and the third, which is broader and more conspicuous than the other, is parallel with the hind margin; the costal margin has several darker as well as lighter spots, all of them small but distinct: the hind wings are gray-brown, the costal margin and fringe paler, and inclining to red: the head and thorax are red-brown, and densely clothed with scales; the body gray-brown, inclining to red at the tip.

The EGGS are laid about the middle of April, on dock (*Rumex*), and are hatched in a few days: the young CATERPILLARS continue feeding until the first or second week in June. When full-fed, the caterpillar rests in a straight position on the leaves or leaf-stalks of the dock, but rolls itself in a compact ring and

falls to the ground when annoyed; the head is small but exserted; it is narrower than the second segment, but is never received into it; the body is velvety and obese; it is rather attenuated at the anterior extremity; the colour of the head prior to the last moult is dull brown, with a paler reticulated line down the middle of the face, and another on each cheek; the body is umber-brown of two shades, which form bands across the back, the paler bands being at the interstices of the segments; the entire surface is delicately reticulated; there is a short white or yellow linear mark on each side of each segment; this is always in the dark bands, and above each of these marks are two round white dots; there is a continuous bright yellow stripe just below the spiracles, which are black, and which touch and seem to rest on this yellow stripe; the colour of the spiracles is always black; the ventral is rather paler than the dorsal area, and the legs and claspers are of the same colour. After the last moult considerable change takes place in the colouring; the bright yellow stripe in the region of the spiracles disappears, and its position is only to be traced by searching with a lens along the side, when a very indistinct stripe will be found just below the spiracles, except on the second segment close to the head, where an ochreous-yellow line clearly marks the site where the bright yellow stripe commenced; the white or yellow linear spots on each side of the back remain very distinct; and in the space between each of these is a circular white spot; immediately above it is of an intensely dark velvety brown, almost black; the ground colour below each linear spot is also very dark, so that these markings are rendered very conspicuous; the dark colour of the back assumes somewhat the appearance of a series of inverted pyramids, the apices of which point towards the anal extremity.

The MOTH appears on the wing in March and April, frequenting the catkins of the sallow: it is very generally distributed in England, and has been taken rather abundantly in Scotland. Mr. Birchall reports it from the county Wicklow, in Ireland, on the authority of Mr. Bristow. (The scientific name is *Tæniocampa rubricosa.*)



576. The Clouded Drab (*Tæniocampa instabilis*).

576. THE CLOUDED DRAB.—The palpi are very inconspicuous; the antennæ slightly serrated in the male, quite simple in the female: the wings are very different in colour and markings, the ground colour varying to almost every shade of ferruginous brown and gray-brown, sometimes plain and almost unicolorous, at others mottled and marbled; the discoidal spots are usually entire, their circumscription clearly defined in pale gray, almost white; and there is also usually a very distinct pale line parallel with the hind margin; this is slightly irregular, scarcely so much so as to be called zigzag: the costal margin is usually paler, and interrupted with

darker spots; and there is generally a median transverse cloud. Notwithstanding the general occurrence of these markings, in some of my specimens they are scarcely perceptible, and in others entirely absent: the hind wings are gray-brown, the discoidal spot being distinctly darker and of a crescentic form; the fringe is paler: the head and thorax vary in colour with the fore wings; they are densely clothed with scales; the body is gray-brown.

The CATERPILLAR rolls in a ring when touched. The head is green, shining, and unspotted: the body bright pea-green, with a whitish ring immediately behind the head, a narrow whitish medio-dorsal stripe, another on each side supra-spiracular; intermediate between the dorsal and supra-spiracular stripes is another indistinct stripe, composed of a series of whitish dots: every part of the caterpillar is sprinkled with whitish dots, except the belly, which is sprinkled with black dots; the disks of the claspers are also intensely black; occasionally black dots of uniform size, but at irregular distances, appear on the back and sides. It feeds on sallow (*Salix caprea*), oak (*Quercus Robur*), and also on dock and many other plants, and is full fed about the 10th of July: it buries itself in the earth to assume the CHRYSALIS state.

The MOTH appears on the wing in March and April, and is plentiful and generally distributed throughout the kingdom. (The scientific name is *Tæniocampa instabilis.*)



677. The Northern Drab (*Tæniocampa opima*).

577. THE NORTHERN DRAB.—The palpi are almost hidden; the antennæ are slightly pectinated in the males, simple in the female: the fore wings are slightly pointed at the tip; their colour is various; there are two principal varieties, the first, pale gray-brown, with a median darker shade; the second, uniform darker brown, without a median darker shade; in both instances the discoidal spots are distinctly outlined in pale gray, and there are usually three pale transverse lines; the first bent or waved, and situated before the orbicular; the second, oblique and waved, beyond the reniform; and the third more distinct than the others, oblique and parallel with the hind margin: the hind wings are gray-brown, with a paler fringe; the head and thorax are plain gray-brown, and densely clothed with scales; the body is slightly paler.

The head of the CATERPILLAR is of a brick-red colour, reticulated with brown; the dorsal area of the body is purplish-brown, reticulated or rather delicately striated with a paler tint; there is a very distinct and paler medio-dorsal stripe, and a lateral stripe also paler; the ventral surface, as far as the spiracles, is of a bright yellow-green; the spiracles are white in black rings; the legs and claspers are dingy semi-transparent yellow-green, slightly tinged at the extremities with rosy brown: it feeds on sallow (*Salix caprea*).

The MOTH appears on the wing in March and April. It is by no means generally distributed, but has been taken freely in Sussex, Herefordshire, Radnorshire, on both the Cheshire and Lancashire sides of the Mersey, and in the Lake District. (The scientific name is *Tæniocampa opima.*)

Obs. There seems to be a constant difference between this species and the preceding, in the third pale line being more direct in *Opima* than in *Instabilis*, in which I have described it as slightly irregular: in other respects they are very similar; but I have always observed that *Opima* is far more constant in colouring. The two varieties noticed above are the only ones which are at all of frequent occurrence.



578. The Lead-coloured Drab (*Tæniocampa Populeti*).

578. THE LEAD-COLOURED DRAB.—The palpi are very inconspicuous; they are pale at the tips, but nearly black on the outside; the antennæ of the male are rather strongly pectinated, those of the female quite simple: the colour of the fore wings is gray-brown, with a purple or violet tinge, inclining to dove-colour; the discoidal spots are distinctly outlined in pale gray, and the median area of each is rather darker than the ground colour; there is but one manifest transverse line, and that is parallel with the hind margin, irregular, interrupted, and slender; it is preceded by, and almost united with, a darker line, also irregular and interrupted: the hind wings are very dingy gray-brown, the crescentic discoidal spot being scarcely visible; the fringe is rather paler: the head and thorax are of the same colour as the fore wings, the body slightly redder.

The EGGS are laid in little clusters on the twigs of poplar and aspen trees, just below the axils of the leaves, before the leaves have expanded in the spring; and the young CATERPILLARS emerging in May, or sometimes even at the end of April, attack the newly-expanded leaves, spinning two or three together and living between them: in the young caterpillar the head is almost black, but when older becomes of a paler colour, almost buff: the ground-colour of the dorsal area of the body is dingy white, as is so commonly the case with caterpillars that live, during any portion of their existence, concealed: there is a broad and very distinct medio-dorsal stripe, almost white, and a narrower one on each side of it less distinct: the whole surface of the body is sparingly clothed with whitish hairs: the spiracles are encircled by slender waved whitish lines: during the whole of its caterpillar life it continues to feed between united leaves of various species of poplar, preferring that known as the black Italian, and may be found full fed throughout the month of June; it then descends to the ground, and penetrates deeper than the other species of the same genus: throughout life it is fond of company, and Mr. Greene found a "nest" of thirteen chrysalids altogether at the roots of a poplar.

The MOTH appears on the wing in March and April, and is widely, although perhaps not generally, distributed. Mr. Reading records its having been taken at gas-lamps at Woodside, Plymouth; it has also occurred in all the metropolitan and eastern counties, and again in Herefordshire, Worcestershire, Warwickshire, Staffordshire, Nottinghamshire, the Lake District, and Yorkshire; and Mr. Birchall reports it from Wicklow and Killarney, in Ireland. (The scientific name is *Tæniocampa Populeti.*)

Obs. This species seems to me best distinguished from the two which precede it by its more pectinated antennæ.



579. The Common Quaker (*Tæniocampa stabilis*).

579. THE COMMON QUAKER.—The palpi are porrected and rather conspicuous, the apical joint naked; the antennæ are rather strongly pectinated in the male, slightly serrated in the female: the colour of the fore wings is wainscot-brown, inclining to ochreous-red, and very uniform; the discoidal spots are near together, and distinctly but delicately outlined with pale ochreous, the enclosed area being concolorous with the general area of the wing; there is a distinct and conspicuous pale line parallel with the hind margin, and the parallel wing rays which pass through this to the hind margin are pale; there are also three transverse series of black dots, the first situated

before the orbicular, and often forming an irregular but nearly continuous line; the second consisting of six or eight dots, and situated beyond the reniform, and the third also consisting of six or eight black dots, being just within the hind-marginal fringe; there is frequently, but not invariably, a black dot at the base of the wing: the hind wings are gray-brown, their hind margin waved, and the fringe long and pale: the head and thorax are wainscot brown, inclining to ochreous red; the body is gray-brown.

The CATERPILLAR does not roll itself in a ring when touched, but falls off its food plant and twists itself violently, bringing head and tail together alternately on each side. The head is rather large, the body uniformly cylindrical, and quite smooth. The colour of the head is pellucid, shining glaucous-green; of the body delicate, clear bright green, and velvety, with a slender pale medio-dorsal stripe, very indistinct, but rendered perceptible by the action of the dorsal canal; a narrow transverse yellowish band crosses the back of the twelfth segment: the dorsal surface is mottled with indistinct paler dots; the ventral surface is glaucous-green, and unspotted. It feeds on oak (*Quercus Robur*), is full-fed in the beginning of July, when it changes to a CHRYSALIS on the surface of the earth, perhaps spinning a few silken threads, but making nothing that can be properly called a cocoon.

The MOTH appears on the wing in March and April, and is universally distributed and abundant throughout the kingdom. I know of no species of which the chrysalis is to be obtained more plentifully by digging at the roots of trees, as so strenuously recommended by Mr. Greene: I have known a collector obtain more than two thousand chrysalids of this species in the course of a week's pupa-digging: they may be found throughout the autumn at the foot of every oak. (The scientific name is *Tæniocampa stabilis*.)



580. The Powdered Quaker (*Tæniocampa gracilis*).

580. THE POWDERED QUAKER.—The palpi are very inconspicuous, their naked tips scarcely projecting beyond the head; the antennæ are serrated in the male, simple in the female: the fore wings are rather pointed at the tip; their colour is gray, with an ochreous, or, in some specimens, an indistinctly reddish tint; the discoidal spots are outlined, but not always very distinctly, with a slender paler line; their median area is darker than the general area of the wing, more especially the lower portion of the reniform; there is a pale transverse line parallel with the hind margin, and also two transverse series of black dots, the first beyond the reniform, and always seated on the wing-rays, which are paler than the general area of the wing; the second just within the hind-marginal fringe, and never on the wing-rays; there are also minute black dots scattered sparingly over every part of the wing: the hind wings are pale gray at the base, gradually deepening in shade until they become smoke-coloured at the hind margin; the discoidal spot is crescentic and rather distinct; the fringe very pale.

The CATERPILLAR rolls in a ring when touched. The dorsal area of the body is dull green, with three paler narrow stripes, and between these paler stripes is a series of pale dots; the broad green portion of the back is bordered on each side by a smoke-coloured stripe, the upper margin of which is suffused and indistinct, the lower margin sharply defined and very distinct; on each side below the smoke-colour is a pale green stripe, paler still at both its upper and lower margins. The belly and claspers are pellucid green.

It feeds on sallow (*Salix caprea*), and is full-fed in the beginning of July. An unusual variety of the caterpillar is described by Mr. Hellins in No. 12 of the *Entomologists' Monthly Magazine*. The ground colour of this variety was deep brown, tinged with pink, the slender medio-dorsal and sub-dorsal stripes of the same, but becoming rather paler; along the region of the spiracles and reaching half way down the anal claspers, is a broad stripe of pale dingy pink, sharply edged above with a fine blackish line; the belly and legs are concolorous with the ground colour; the usual dots were present, but of a dark brown colour, and enclosed in paler rings, and the dorsal area was slightly freckled with the paler tint.

The MOTH appears on the wing in April and May, and is widely distributed in our English counties, and Mr. Birchall obtained it at Killarney, in Ireland. (The scientific name is *Tæniocampa gracilis*.)



581. The Blossom Underwing (*Tæniocampa miniosa*).

581. THE BLOSSOM UNDERWING.—The palpi are porrected rather conspicuously: their tips very slender; the antennæ are pectinated in the male, simple in the female; the fore wings are gray, strongly tinged with red, and having a median band of a brighter red, approaching to orange: this band in many specimens does not reach either the costal or the inner margin; the circumscription of discoidal spots is very vague and imperfect, but the median area of the reniform is inclined to smoky brown and rather conspicuous: the hind wings are pale gray, with pink opalescent reflection, and having a small but rather conspicuous discoidal spot, and two indistinct transverse waved lines, slightly darker than the general area: the head and thorax are densely clothed with scales, and are of the same colour as the fore wings; the body is paler.

The impregnated female performs the duties of oviposition during the first week in April, and sometimes even at the end of March; she settles on a twig of oak (*Quercus Robur*), and deposits from sixteen to twenty-five eggs in a cluster just below the leaf-bud, and of course before there is any symptom of vernal vitality. The young CATERPILLARS do not emerge for a month or more, and then unite their labours in constructing a silken web, completely enclosing the terminal twig, and residing constantly beneath the shelter of their tent; as soon as the oak-buds are sufficiently expanded to afford an abundant supply of food—a period of from ten or twelve to twenty days, according to the temperature—the caterpillars separate and distribute themselves over the food-plant; they usually select the lower branches or frequently the shrub-like oaks in hedges, and from these they wander to bushes of white-thorn (*Cratægus oxyacantha*), and even to the low herbaceous plants in the hedge-rows and on the hedge-banks: after the social or gregarious propensity of these caterpillars has deserted them, and their solitary walk through life has begun, they feed greedily and increase in stature very rapidly; sometimes the social life endures for ten days, and the solitary life for ten more; in other instances the caterpillar existence is extended to twenty-six days; the full-fed caterpillar rests in a straight position, but falls from its food-plant if annoyed, forming a loose ring, with the head on one side; the head is rather narrower than the body, which is almost uniformly cylindrical, the anal claspers projecting behind and spreading; the head is lead-coloured, with black blotches; the body variegated; a bright yellow medio-dorsal stripe extends the entire length; this is irregular in breadth and interrupted at the incisions of the segments; on each side of this medio-dorsal stripe is a broad lead-coloured space, often tinged with pink, and always irrorated and variegated with intense velvety black; this is bounded below by a narrow and interrupted pale yellow stripe, and this again

by a narrow space or stripe of intense velvety black; then follows a pale stripe, which includes the spiracles: this is varied with yellow and white, and spotted with black; the ventral area, legs, and claspers are smoky-pink, sprinkled with black spots. At the end of May these caterpillars descend to the ground, and change to smooth, pale-brown CHRYSALIDS, among fallen leaves and other rubbish.

This delicately-coloured MOTH appears on the wing in March and April; it is widely, but not generally, distributed in England. It has been taken in Cornwall, Devonshire, Somerset, Wilts, Dorset, Isle of Wight, Sussex, Surrey, Kent, Essex, Berks, Gloucester, Herefordshire, and Yorkshire, but is not reported in the Scotch and Irish lists. (The scientific name is *Tæniocampa miniosa.*)



582. The Twin-Spotted Quaker (*Tæniocampa munda*).

582. THE TWIN-SPOTTED QUAKER.—The palpi are inconspicuous; the antennæ are pectinated in the male, serrated in the female; the colour of the fore wings is gray, strongly suffused with ochreous, saffron or wainscot-brown, and always freckled, and more or less clouded with other shades of brown; the orbicular spot is very indistinct, often imperceptible; its circumscription is pale, its median area exactly of the same tint as the general ground-colour of the wing; the reniform is distinct; and its circumscription pale, its median area dark, more especially at the lower extremity; there are two closely approximate and very conspicuous black spots on the disk of the wing nearly equidistant from the costa, hind margin, and reniform spot: the hind wings are smoky-gray, and almost invariably conspicuously darker than the fore wings, and having a still darker crescentic discoidal spot.

The CATERPILLAR falls off its food, rolls in a ring, and feigns death when touched or disturbed; it is smooth and uniformly cylindrical. The head is nearly equal to the body in diameter, and is of a pale, very shining wainscot-brown, mottled with black in the middle of the face and reticulated on the cheeks. The ground-colour of the dorsal surface is putty-white, mottled or sprinkled and reticulated with velvety black, and having an extremely narrow pale medio-dorsal stripe; and on each side of the pale dorsal area is a series of small, circular, pure white spots; these are three in number on each segment, and are not arranged in a direct line, the middle one of each three being slightly near a median line of the back than either of the others; an intensely black, but not very clearly defined, waved stripe extends the whole length of each side, and immediately below this is a pale area, and in this area are small white patches on the fourth, fifth, and sixth of the segments; the dorsal surface of the twelfth segment is very dark, except on its posterior margin, which is pale; the legs and claspers are pale: the anal pair of claspers is spreading; the belly is smoky-gray. It feeds on oak (*Quercus Robur*) and plum, and is full-fed at the end of May.

The MOTH appears on the wing in March and April, and has been taken in most of our English counties; it is common in some parts of Scotland, and Mr. Birchall has taken it at Killarney, in Ireland; Mr. Greene has found the chrysalids at the roots of oaks in Gloucestershire, in October. (The scientific name is *Tæniocampa munda.*)



583. The Small Quaker (*Tæniocampa cruda*).

583. THE SMALL QUAKER.— The terminal joint of the palpi is rather long and slender; the antennæ are strongly serrated in the male, simple in the female: the fore wings are very black at the tip, their colour is dingy ochreous-gray, often interspersed with brighter ochreous

markings, and these brighter markings generally surround the discoidal spots; these are rather obscure, but manifestly darker than the general area of the wing, which always has a freckled or mottled appearance; beyond the reniform is a transverse series of black spots, very small and indistinct; and there is a second series on the extreme hind margin: the hind wings are gray-brown, and darker than the fore wings; their fringe is paler: the head and thorax are gray, tinged with dingy ochreous; the body is pale gray.

The CATERPILLAR is pale green, sometimes grayish or brownish; the medio-dorsal and sub-dorsal stripes are whitish-green, and between them is a row of dark green dots; the spiracular stripe and incisions of the segments are yellowish (*Freyer*). It feeds on oak (*Quercus Robur*).—*Stainton's Manual*, vol. i., p. 245.

The MOTH appears on the wing in March and April, and is common in all parts of the United Kingdom, sometimes frequenting the catkins of the sallow in great numbers. Mr. Greene says that the chrysalids of *Stabilis*, *Instabilis*, *Gothica*, and *Cruda* are extremely abundant at the roots of various trees in October: he remarks of the species of *Tæniocampa*, they may easily be found by simply shaking the sod, or loosening the earth (at the roots of trees); and by taking a large number (once he had a thousand chrysalids of *Instabilis*) of the common species, some curious and beautiful varieties may be obtained without trouble. (The scientific name is *Tæniocampa cruda*.)



584. The Suspected (*Orthosia suspecta*).

584. THE SUSPECTED.—The palpi are porrected and slender, the terminal joint unusually slender and pointed; the antennæ are simple in both sexes: the fore wings are rather narrow; their colour is red-brown, mottled and freckled with various tints; both the discoidal spots are outlined in pale gray, the median area of each being concolorous with the general colour of the wing; half-way between the reniform and the hind margin is a transverse series of compound spots, all of them seated on wing-rays; each of these spots has a darker and a lighter portion, the darker portion being nearest the base: the hind wings are gray-brown; the head and thorax are of the same colour as the fore wings, the body being dingy gray.

The MOTH appears on the wing in July, but is rare and local; it has been taken almost exclusively in the North, Lancashire, the Lake District, and Yorkshire: my specimens came from Huddersfield. (The scientific name is *Orthosia suspecta*.)



585 The Dismal (*Orthosia Upsilon*).

585. THE DISMAL.—The palpi are inconspicuous, the terminal joint being almost concealed by scales; the antennæ are simple in both sexes: the fore wings are ample; their colour is bistre-brown; the orbicular stigma is oblique and oval, and outlined in paler brown; the reniform is scarcely perceptible; between them is the figure of a Greek upsilon Υ, very distinctly defined in most specimens; parallel with the hind margin is a transverse zigzag line, of a pale ochreous-brown colour: the head and thorax are bistre-brown: the hind wings and body are dingy gray-brown.

The CATERPILLAR rolls itself into a lax ring when disturbed, and falls off its food-plant, but very soon abandons this posture, and crawls with great vigour and almost incredible activity: the head is small and shining, the body uniformly cylindrical, smooth, and velvety. The colour of the head is pale brown, reticulated with darker brown; the body is brown, with a medio-dorsal series

of somewhat shuttle-shaped pale markings, placed end to end, and forming an almost continuous stripe: there is a slightly paler mark on each side, including the spiracles, which are situated just within its upper margin; the dorsal area, as far as this lateral stripe, is variegated or marked with velvety black: the belly and claspers are paler. It feeds by night on the common willow (*Salix fragilis*), and other narrow-leaved species of the same genus, descending in the morning to the ground, or concealing itself in a crevice of the bark; on the approach of night these caterpillars leave their hiding-places, and crawl up the trunks of the willows, travelling at a great rate, and in windy weather invariably keeping on the lee side of the trunk. They are full fed at the end of May, when they finally descend to the ground, and change to CHRYSALIDS in a slight cocoon on the surface of the earth.

The MOTH appears on the wing in July, and may sometimes be observed by hundreds sporting in the evening over the tops of willows, always those of narrow-leaved species: it occurs in all our English counties; but Mr. Reading says it is rare and local in Cornwall and Devonshire, except as regards the neighbourhood of Exeter, where Mr. Parfitt has found it commonly. Mr. Birchall met with it in the county Wicklow, in Ireland. Mr. Greene says the caterpillars may be found in profusion under loose moss and bark of willows and poplars, but they must be fed: the CHRYSALIS may be found at the beginning of July in the same situations, or spun up at the roots. (The scientific name is *Orthosia Upsilon.*)



586. The Red-Line Quaker (*Orthosia lota*).

586 THE RED-LINE QUAKER.—The palpi are porrected and pointed; they are clothed beneath with black bristly scales; the antennæ are simple in both sexes: the fore wings are pointed at the tip; their colour is dull leaden-brown, or dull ochreous-brown, the two shades being equally common; and there are also other intermediates of less frequent occurrence; the discoidal spots have a very slender pale circumscription, and outside of this a slender brick-red circumscription; the lower half of the reniform is almost black; parallel with the hind margin is an oblique compound line, the inner portion of which is brick-red, the outer portion ochreous-gray; both colours are sharply defined and very distinct: the hind wings, head, thorax, and body are leaden gray-brown.

The CATERPILLAR is dull dingy-brown, with a slight tint of purple, and is powdered over with minute white dots; it has a narrow medio-dorsal stripe of almost pure white, interrupted at the incisions of the segments. It feeds on the common willow (*Salix fragilis*) or sallow (*Salix caprea*), and secretes itself during the day in the cracks of the bark, ascending the tree only at night. It generally changes to a CHRYSALIS between the leaves of the sallow or willow, but sometimes on or near the surface of the ground in a slight web.

The MOTH appears on the wing in September and October, and comes freely to sugar and to ivy bloom, and to the luscious mucilaginous berries of the yew: it occurs in all our English counties, and has also been taken in Scotland: Mr. Birchall informs us it is common and widely distributed in Ireland. (The scientific name is *Orthosia lota.*)



587. The Yellow-Line Quaker (*Orthosia macilenta*).

587. THE YELLOW-LINE QUAKER.—The palpi are porrected, pointed, and very pale in colour; the antennæ are ciliated in the male, simple in the female: the fore wings are rather narrow, their colour is yellow-ochre; the orbicular is scarcely perceptible, i-

most specimens it is entirely absent; the reniform is indistinct, but the lower half of its median area is dark, forming a rather conspicuous spot; parallel with the linear margin is an oblique compound line, the inner portion of which is slightly darker, the outer portion slightly paler than the general area of the wing: the hind wings are smoke-coloured and much darker than the fore wings, having an indistinct crescentic discoidal spot and a broad ochreous fringe: the head and thorax, and a tuft at the extremity of the body in the male, are yellow-ochre; the body itself smoke-coloured.

The CATERPILLAR is very beautiful; it is of a testaceous brown colour, powdered with minute dots, and having five very distinct white stripes, one being medio-dorsal, one on each side lateral or sub-dorsal, and another in the region of the spiracles. It feeds on beech (*Fagus sylvatica*).

The MOTH appears on the wing in September and October, and is especially partial to the luscious mucilaginous berries of the yew, and also frequents the ivy bloom, and comes to sugar. Mr. Greene says of the chrysalis, "of this species, so difficult to obtain good in the perfect state, I have found only three: the chrysalis, which is extremely delicate, is enclosed in a weak cocoon;" it may be found at the roots of birch in September. It is common and generally distributed in England, Scotland, and Ireland. (The scientific name is *Orthosia macilenta*.)



588. The Flounced Chestnut (*Anchocelis rufina*).

588. THE FLOUNCED CHESTNUT.—The palpi are pointed and very slightly porrected; the antennæ are almost simple in the male, quite so in the female: the colour of the fore wings is reddish-brown, inclining to fulvous, and having two darker transverse bands, in which there is no tinge of fulvous; the first of these is short and near the base; the second is beyond the reniform spot, and is interrupted by a series of acutely wedge-shaped marks running into it from the middle of the wing; the two discoidal spots are delicately outlined in a paler colour, and between them is an indistinct transverse bar rather sharply angled in the middle: the hind wings are smoky-gray, bordered with rosy-gray on the costal and hind margins: the head and thorax are reddish-brown tinged with fulvous; the body is pale gray at the base, reddish-gray towards the extremity.

The beautiful CATERPILLAR of this species is represented by Hübner as of a bright orange-colour, with a yellowish-white medio-dorsal stripe, and a series of whitish spots on each side of it; there is a broad white stripe in the region of the spiracles. It feeds on oak (*Quercus Robur*).

The MOTH appears on the wing in September and October, and occurs, but not generally, in most of our English counties, extending northwards over the whole of Scotland, so far as hitherto examined; and Mr. Birchall says it is common and widely distributed in Ireland: it comes freely to sugar. (The scientific name is *Anchocelis rufina*.)



589. The Beaded Chestnut (*Anchocelis pistacina*).

589. THE BEADED CHESTNUT.—The palpi are very inconspicuous; the antennæ almost simple in the male, quite so in the female: the fore wings are so various in colour that it is impossible to define any particular colour as

peculiar to the species; the prevailing tint is orange or ochreous-gray, sometimes inclining to brick-red, at others to gray-brown, and again at other times to simple ochreous; the discoidal spots are generally present, but in some specimens I find no trace of them; the reniform is long and rather narrow; it is outlined in pale yellowish-gray, and the median area is gray-brown; the orbicular is extremely narrow, and very oblique; its obliquity is in a contrary direction to that of the reniform; the wing-rays are sometimes much paler than the general area, and when this is the case, slender transverse lines cross them, giving the entire surface of the wing a reticulated appearance; the costal margin is spotted, the spots being both darker and lighter than the ground colour; there are also several transverse series of darker spots or markings: the hind wings are very dark smoke-colour, with pale fringe; the head and thorax generally take the colour of the fore wings, but the body is paler than the hind wings, and tipped with rosy.

The EGGS are laid in the autumn, on the herbage in meadows after the hay-crop has been harvested, more especially on the flowering stems of various species of *Ranunculus* (butter-cup), on the leaves of which the CATERPILLAR feeds. The caterpillars do not emerge until the spring, when they ascend the stalks of the food-plants, which are probably very various, including many grasses; they are full-fed at the end of May and beginning of June, and then may be readily obtained by sweeping standing grass morning and evening, but not so abundantly in the middle of the day. When a caterpillar is disturbed it forms itself into a ring, and rolls to the bottom of the sweeping-net; but on being removed from the *débris* there collected, a strangely heterogeneous mass, it soon finds the use of its legs, and crawls with considerable rapidity. The head is of nearly the same width as the body, semi-porrected in crawling; the body velvety, of uniform substance throughout, and perfectly without humps: the colour of the head is dull green, of the body delicate apple-green, with an extremely slender medio-dorsal stripe almost white, and a somewhat broader and much more distinct lateral stripe, also nearly white; there are, besides, a few white dots on the dorsal surface, each emitting a short and slender hair; on the second and third segments six of these dots form a straight transverse series; on each of the following segments, namely, the fifth to the twelfth, both inclusive, are four of these dots, forming somewhat of a quadrangle: as the caterpillar moves, a transverse skinfold becomes conspicuous at the interstices of the segments, and these skinfolds assume the appearance of evanescent yellow rings; the spiracles are very pale, almost white, and each is surrounded by a black margin; behind each spiracle there is often a jet-black spot; the whole of the dorsal surface is moreover freckled with minute amorphous markings, scarcely differing from the general ground-colour; the ventral surface and claspers are apple-green; the legs paler. It spins a very tight, neat, earthen cocoon, in which it remains some weeks before assuming the CHRYSALIS state: the cocoon, when kept dry, becomes exceedingly brittle.

The MOTH appears on the wing in September and October; it is common in most of our English counties, and is found also in Scotland. Mr. Birchall says it is common and widely distributed in Ireland. It comes freely to sugar, to ivy, and to the berries of the yew. (The scientific name is *Anchocelis pistacina*.)

Obs. I will here quote at length the instructions given by Mr. Walton for capturing moths while feeding on the berries of the yew, this species having been taken on that tree in especial abundance:—"I will now describe, in as few words as possible, consistent with clearness, the method of capturing the moth at the berries of the yew. I use a bull's-eye lantern, with a powerful lens, the larger the better; a pair of forceps, such as are generally used by entomologists, having the sides and bottom covered with white gauze, and about six inches wide at the mouth when opened. Also I use a portable sliding-rod, or one with two lengths, jointed like a fishing-rod, from six to nine feet long, and a

small round net, made of white gauze or muslin, screwed or fixed on at the end, of about five or six inches diameter, and the same in depth. I then direct the rays of light upon the insect. If it is within reach I use the forceps, and take it very deliberately; if out of reach, but within the length of the rod, they are easily jarred into the small bag at the end of your rod, lowered down, and transferred into the forceps. In this way they are captured with certainty, and the most surprising facility, principally in consequence of that singular instinctive faculty which many insects possess, in a greater or less degree, of feigning death when alarmed. For example, *Orthosia pistacina* and *O. litura* contract their legs and wings, and fall into the bag-net or forceps immediately when touched, tumbling and rolling about without evincing the least signs of life; and so do many others. On the contrary, *O. macilenta* and others, under the same circumstances, exhibit very little, if any, of that predisposition for feigning death. They will try to creep away when disturbed, having no inclination to use their wings, but are easily jarred off the berries or leaves into the bag-net, or induced to creep upon some part of it, until they are finally secured with the forceps. If they happen to miss the net in the act of falling, they invariably drop lightly to the ground, and may be taken from the grass with the forceps. The above observations only apply to the *Noctuas*, which carry their wings horizontally; the *Geometers*, which carry their wings erect, invariably fly away when touched or disturbed. It requires a little patience and address, when beyond the reach of the forceps, to secure any of this family; however, they affect death in some degree, and will fall a short distance as if shot when the rays of light are directed upon them, and the small bag-net held just under them. It is necessary to wait patiently a few seconds, and gently to touch the twig with the ring of your net, until they feel inclined to exercise that shamming propensity; it must then be lowered with care, otherwise, if alarmed or disturbed, the insect will fly out of the bag before you can place over the top the flat side of your forceps. Take the bag-net to some convenient place, and the insect will be seen adhering to the bottom or sides, with its wings erect; then place the mouth of the forceps in a vertical position over the circle of the bag-net, and lower it to the ground. This operation will raise up the bottom of the net, and with it the insect, which will fly up into the forceps, and these being closed at the sides, as before directed, it cannot escape. The yew tree seems to flourish best in chalky districts. Few persons are aware of the great age and gigantic size of many of these magnificent trees in Norbury Park. They seem common in the woods and hedgerows on the chalk in Kent and Surrey. Those in Norbury Park are really a natural curiosity. I invite entomologists to examine them, more particularly, of course, when the fruit is ripe. I am convinced they will be rewarded by new discoveries."



590. The Lunar Underwing (*Anchocelis lunosa*).

590. The Lunar Underwing.—The palpi are porrected, their terminal joint naked; the antennæ are very nearly simple in the male, quite so in the female: the outline of the costal margin of the fore wings is slightly produced before the tip; their colour is various, sometimes rich bistre-brown, at others pale olive-brown, or pale ochreous-brown; the discoidal spots have a pale circumscription and a dark median area; the wing-rays are generally decidedly paler than the general area of the wing; and a pale transverse band, always accompanied by a series of very dark spots, crosses the wing parallel with the hind

margin: the hind wings are pale with a conspicuous dark discoidal spot, and an interrupted dark bar parallel with the hind margin: the head and thorax are of the same colour as the fore wings, the body is darker than the hind wings.

The CATERPILLAR is described by Guenée as stout, rather moniliform, and somewhat flattened below; the head is small and of a brown colour, with two darker lines on the face: the body is of a dull gray-green, and sometimes of a brighter green, with a white medio-dorsal stripe and a white sub-dorsal stripe; there is also a white lateral stripe in the region of the spiracles, and this is delicately bordered above with a black line; the usual dots are large, very observable, wart-like, black, and shining; there is a distinct and very observable plate on the second, and another on the thirteenth segment. It feeds on grasses, particularly in elevated and dry situations, and is fond of concealing itself by day under stones.

The MOTH appears on the wing in September, and is generally distributed in England, Scotland, and Ireland. (The scientific name is *Anchocelis lunosa*.)



591. The Brown-spot Pinion (*Anchocelis Litura*).

591. THE BROWN-SPOT PINION.—The palpi are porrected and pointed, the points naked: the colour of the fore wings is pale reddish-brown, strongly inclined to gray in the basal half: the discoidal spots are distinct; they have a pale circumscription and a dark median area; there are four dark spots on the costal margin; the first, almost close to the base, reaches half-way across the wing; the second is rather oblique, pointing towards the anal angle; the third, also oblique, is situated just about the reniform, and points in an opposite direction to the second; the fourth is much the largest and most conspicuous, and situated very near the tip of the wing; it serves as the commencement of a straggling series of dark spots, which vanish before reaching the inner margin: the hind wings are smoky, with paler fringe: the head, thorax, and body are of the same colour as the fore wings.

The CATERPILLAR is stout and smooth, and varies in the tint of the ground-colour, in the way so common among the caterpillars of *Noctuas*, some specimens being green and others brown; the medio-dorsal stripe is dull dingy white, inclining to green or brown, in accordance with the ground-colour; there is also a lateral stripe of the same pale colour: it feeds on a variety of low-growing plants, perhaps most commonly on meadow-sweet (*Spiræa ulmaria*).

The MOTH appears on the wing in September and October, and is common and generally distributed in England, Scotland, and Ireland, (The scientific name is *Anchocelis Litura*.)

Obs.—This species comes to sugar when spread on the trunks of trees, and has thus been taken freely near Catford Bridge, in my own neighbourhood.



592. The Chestnut (*Cerastis Vaccinii*)

592. THE CHESTNUT.—The palpi are rarely porrected beyond the scales on the head: the antennæ are almost simple in both sexes: the fore wings are broad and short, almost square at the apical angle, but the apex itself is blunt; their colour is wainscot-brown, inclining to red-brown, indistinctly divided by waved transverse darker lines; the discoidal spots are distinctly perceptible; their circumscription is pale; the lower half of the median area in the reniform is almost black; the orbicular is oblong and oblique; its median

area is concolorous with the disk of the wing: the hind wings are smoky-gray, with a reddish fringe, and having a pale transverse waved line, sometimes very indistinct, rather below the middle: the head and thorax are of the same colour as the fore-wings; the body is gray at the base, but reddish beneath and towards the tip.

When full-fed the CATERPILLAR rests in a straight position, but falls off its food-plant and feigns death when disturbed, lying on its back with the entire ventral surface exposed, and the head bent round on one side until it touches the fourth pair of ventral claspers; the head is shining, porrected in crawling, otherwise prone, much narrower than the body, and partially received into the second segment: the body is very obese, velvety, slightly increasing in size from the second to the twelfth segment; the second segment has a semi-circular dorsal plate, the truncate diameter of which is towards the head. The colour of the head is light brown, reticulated with darker brown: the second segment has the dorsal plate dark brown, the anterior and lateral margins darker, and the disk traversed by three pale longitudinal lines; the dorsal surface of the body is purplish brown, irrorated with indistinct pale markings, some of which are so arranged as to form three very narrow pale dorsal stripes, all of them indistinct, but the medio-dorsal one especially so; the spiracles are intensely black; the ventral is paler than the dorsal surface, semi-transparent and tinged with green; the legs are greenish brown, tipped with pale brown; the claspers concolorous with the ventral surface. It feeds on the elm (*Ulmus campestris*), oak (*Quercus Robur*), and Sallow (*Salix caprea.*)

The MOTH appears on the wing in October, November, and even December if mild; it survives the winter and reappears in the spring, not unfrequently being observed on the catkins of the sallow, but then generally in a worn condition: in October it sometimes comes to sugar in such abundance as to be a positive annoyance to the collector. It is found everywhere in England, Scotland, and Ireland. (The scientific name is *Cerastis Vaccinii.*)



593. The Dark Chestnut (*Cerastis spadicea*).

593. THE DARK CHESTNUT.—The fore wings are square and pointed at the tip; their colour is chestnut-brown, rich and dark, with no conspicuous markings; the discoidal spots are to be traced with a lens, and the lower half of the median area of the reniform appears filled up with black: the hind wings are smoky gray, the fringe is reddish-brown: the head and thorax are of the same colour as the fore wings; the body is pale gray at the base, brown-gray in the middle, and reddish towards the tip.

The CATERPILLAR, according to Guenée, much resembles that of *Orthosia lota;* the head is red, with two black lines down the face; the colour of the body is dark-brown, marked with lighter; there is a very indistinct medio-dorsal stripe, broadly clouded with brown; the spiracular stripe is reddish flesh-colour, dotted with paler, and surmounted by a broad band darker than the general ground-colour; there is a corneous plate on the second and thirteenth segments as in *Cerastis Vaccinii.* When young this caterpillar is found on blackthorn and honeysuckle, and is then of a gray-green colour; later in life it descends from these trees and feeds on low plants.

The MOTH appears on the wing in October, and is of common occurrence in England and Scotland, and Mr. Birchall reports it from Ireland on the authority of Mr. Bristow. (The scientific name is *Cerastis spadicea.*)



594. The Redheaded (*Cerastis erythrocephăla*).

594. THE REDHEADED.—The palpi are

concealed by the projecting scales of the head; the antennæ are almost simple in both sexes; the fore wings are reddish-gray; the discoidal spots are distinct; the reniform is pale, with five or six black spots in the lower and outer portion of its median area; the orbicular is round and pale, but has a slightly darker cloud in its centre; a double transverse pale bar crosses the wing parallel with the hind margin; and between this and the reniform is a single and much waved pale line: the hind wings are gray-brown; the head, thorax, and body are reddish-gray.

The CATERPILLAR is gray-brown with a white stripe in the region of the spiracles; this character, however, is uncertain, as some authors suppose there are two species comprised under the single name, namely—*Glabra*, the caterpillar of which possesses this white stripe, and *Erythrocephala*, which is without it; but M. Guenée says he has reared both of these supposed species from the same caterpillars.

The MOTH appears on the wing in November, and is very rare: a single specimen was taken at Ivybridge, in Devonshire, in 1856; a second in Somersetshire, by Mr. Crotch. The principal locality, however, is the Sussex coast, in the vicinity of Brighton, where Mr. Wright has obtained it by sugaring for several years. (The scientific name is *Cerastis erythrocephala*.)



595. The Satellite (*Scopelosoma satellitia*).

595. THE SATELLITE.—The palpi are concealed by the projecting scales of the head; the antennæ are rather stout in the male, slender in the female: the fore wings are rather long and very decidedly scalloped on the hind margin; their colour is reddish-brown, with several transverse darker lines; the orbicular spot is absent; the reniform is difficult to trace, but its situation is generally indicated by the presence of a very conspicuous white spot of considerable magnitude, and accompanied both at the outer upper and outer lower extremity by a smaller white spot; these three spots are sometimes bright orange, and sometimes entirely absent: the hind wings are smoke-coloured, with a paler and rather rosy fringe: the antennæ, head, and thorax are of the same colour as the fore wings; the base of the body is gray-brown shading to rosy red towards the extremity.

The EGG is laid in March, on twigs of oak (*Quercus Robur*), by females which have hybernated; the CATERPILLAR makes its appearance in May, and spins together the leaves of the oak, forming a retreat from which it sallies forth in quest of its living prey, the caterpillar of any other *Lepidoptera* which may happen to have the misfortune to be located in its vicinity: to the entomologist who, like myself, indulges in the rearing of caterpillars, these caterpillars often prove most determined enemies Mr. Buckler writes pathetically on the subject:—"It happens sometimes that in gathering food for other things, one of these wretches, then quite small, lurks among the leaves, and is unconsciously introduced to his prey: an instance of this kind occurred to me a few years ago, when I had reared fifty-seven caterpillars of *Tæniocampa Populeti* from the egg; they were about half-grown, had spun the leaves of poplar together, and were feeding between them: all went well for a time, but at length I observed spots of moisture between the withered leaves, and being puzzled at not finding any caterpillars in the food that was removed, an investigation took place, when I could discover no *Populeti* caterpillars, but an ill-looking monster of a *Satellitia* coiled up at the bottom of the jar. This monster had actually murdered fifty-seven of his fellow-prisoners, and devoured their bodies." I

could not find that my own captives ate any of the oak-leaves provided for them, but feasted on juvenile *Brumatas* and such small deer, until I expelled them from the breeding-cage. These caterpillars are so decidedly cannibalistic in their propensities, that in default of aliens they will devour their own species. When half or three-quarters grown this caterpillar is excessively active, and very persistent in its endeavours to escape observation, crawling with great activity, and often wriggling backwards out of its retreat, after the manner of a *Tortrix* : the head is porrected in crawling, rounded on the crown, and decidedly narrower than the body : the body is nearly cylindrical, but the anterior segments are attenuated. The colour of the head is clear bright brown on the crown, black-brown about the mouth ; that of the body rich velvety-brown ; the second segment has three paler longitudinal lines on the back ; of these the middle one is less distinctly pronounced than the other two : these appear like the anterior extremities of three dorsal stripes, the remaining portion of which has been obliterated in the great number of specimens, but they are slightly indicated in some throughout the entire length of the body : on a line with the spiracles there is present, between the second and third segments, and again between the third and fourth segments, a somewhat linear but inconstant snow-white spot ; a linear white spot on the fifth and another on the eleventh segment; these seem like broken portions of a spiracular line which is very evident in some specimens, but scarcely perceptible in others ; the ventral surface, legs, and claspers are paler, and less velvety than the dorsal surface ; the legs are variegated with black. From Guenée we learn that this caterpillar, when approaching its full size, descends from its exalted station amongst the branches of forest trees, and feeds on humble herbs, like the *Orthosidæ*. It changes to a CHRYSALIS beneath the surface of the earth.

The MOTH appears on the wing in October, and again in the spring after hybernation ; it is common in England, Scotland, and Ireland. (The scientific name is *Scopelosoma satellitia*.)



596. The Dotted Chestnut (*Dasycampa rubiginea*).

596. THE DOTTED CHESTNUT.—The palpi are slightly porrected, the tips pointed and naked ; the antennæ are almost simple and almost alike in both sexes : the fore wings are rather broad and somewhat square ; the hind margin straight, the tip obtuse ; their colour is fulvous chestnut ; the discoidal spots are present, but scarcely distinguishable from the general ground-colour ; the orbicular has a central dot, and the lower half of the reniform is represented by a dark spot ; the general area of the wing is clouded with darker brown, and sprinkled with blackish spots, giving the insect a marked and beautiful appearance : the hind wings are smoke-coloured, with a pink fringe : the head and thorax are fulvous chestnut; the body grayish smoke-colour, inclining to red towards the tip.

The head of the CATERPILLAR, according to Guenée, is narrower than the second segment, black and shining; the body is cylindrical, moniliform, and covered with numerous fasciculated hairs ; its colour is sepia-brown, the second segment being darker, and each of the following segments having a medio-dorsal black spot ; the legs and claspers are concolorous with the body ; the hairs are reddish-brown. It feeds in July on the apple, and also on the dandelion and other low plants ; and changes to a CHRYSALIS in a cocoon composed of silk and earth.

The MOTH appears on the wing in October, and again in the early spring after hybernation. It is a species of considerable rarity, but not so rare as formerly. We learn from Mr. Reading that it has been taken at Plymouth, Bickleigh, Torquay, Teignmouth, Exeter, Alphington, and Barnstaple, all in Devonshire ; near Weston, in Somersetshire ; in the New Forest, Hampshire ; at Worcester ; at Brighton, in Sussex ; and Norbury, in Surrey,

where it was discovered by Mr. Walton feeding on the yew-berries. He writes: "I was extremely fortunate in detecting the locality for this insect, as it is stated to be unknown; there were previously only two specimens reputed to be British, one in the British Museum, and the other in the cabinet of Mr. Dale. I captured mine at intervals from the 10th of October to the 6th of November, all equally perfect and beautiful." Mr. Birchall informs us that in Ireland it is widely distributed; he had taken it at Dublin, Tullamore, and Killarney. The scientific name is *Dasycampa rubiginea.*)



597. The Orange Upper-Wing (*Hoporina croceago*).

597. THE ORANGE UPPER-WING.—The palpi are decidedly porrected, connivant, and forming a kind of beak with closely approximate points; the antennæ are almost simple in both sexes: the fore wings are very straight on the costa, and nearly square at the tip; their colour is reddish fulvous with five or six elongate and pure white spots on the costal margin; the two discoidal spots are present but very indistinct; the wings are sprinkled over with black markings which form indistinct obliquely transverse series, and in two instances almost continuous lines: the hind wings are very pale, almost white, but just stained with saffron, and having a slender transverse median line very indistinct, and a marginal orange line equally slender and indistinct: the head and thorax are reddish fulvous; the body is very depressed, white at the base, and pale gray-brown in the middle and at the extremity.

Mr. Pristo has given us in the "*Entomologist*," a most interesting life-history of this species, which I have extracted entire, interpolating my own description of the CATERPILLAR. "On the 11th of November, 1864," says Mr. Pristo, "I happened to take an oak-branch, covered with dry leaves, from a hedge, and to my astonishment two specimens of *Hoporina croceaga* crawled out from beneath the leaves. Having a couple of boxes in my pocket, I quickly secured them: they were taken home and put into a cage in an out-house, with a portion of the resting-place they had chosen. Being anxious to know as much of their habits as possible, I visited them nearly every evening, and with great satisfaction. They were supplied with sugar in a sponge, but although they generally came out from their hiding place on mild evenings, I could not see them touch the sugar till the 5th of April, 1865. They rested by day among the leaves, and could scarcely be detected, so well does their colour match with the leaves. I had often wondered if my two insects were a pair; fortunately they were: on the 16th of March I had the pleasure of seeing them *in cop.* at 8 p.m. The EGGS were deposited singly, on the cage and on the oak-leaves, from the 7th to the 20th of April. These began hatching on the 26th of the same month, and the young caterpillars were supplied with oak, fed well, and grew remarkably fast. When full-grown the caterpillar rolls in a compact ring if disturbed: its colour is wainscot-brown, tinged with orange, and most delicately mottled with the same colour of a rather darker hue; this darker colour is very apparent in a V-shaped mark on the back of every segment, the apex of the V pointing towards the hinder extremity of the caterpillar: it feeds on oak. The caterpillars began going down on the 5th of June, and had all disappeared by the 12th of the same month. They spun a slight cocoon just beneath the surface of the soil, and remained till the 25th of August before changing to CHRYSALIDS. The first moth appeared on the 9th of September, the last on the 6th of October; the greatest number in one day, six—on the 26th of September. The produce of the pair was thirty-three perfect specimens."

The MOTH appears on the wing throughout September and October, and has been found

principally in Devonshire, especially at Plymouth, Ivybridge, Bickleigh, Devonport, Exeter, and Barnstaple; also in Somersetshire, Wiltshire, Isle of Wight, New Forest, Worcestershire, &c. (The scientific name is *Hoporina croceago.*)



598. The Orange Sallow (*Xanthia citrago*).

598. THE ORANGE SALLOW.—The palpi are rather long, straight, and very sharp-pointed; the antennæ are simple in both sexes: the fore wings are slightly arched and pointed at the tip; their colour is saffron-yellow; the discoidal spots have a very slender but perceptible circumscription somewhat darker than the general area of the wing; the reniform has its median area also darker; three darker transverse lines cross the wing, dividing it into four nearly equal portions; the first of these is very slender; it originates on the costa, tends for a short distance towards the anal angle, and then is suddenly elbowed; turning towards the base of the inner margin, before it reaches which it is again elbowed, and finally meets the second transverse line on the inner margin; the second is oblique, and rather diffuse, but much the most conspicuous of the three; the third is very slender, but very distinct; it is situated half-way between the second and the hind margin: the hind wings are slightly tinged with saffron, but very pale; the head and thorax are of the same colour as the fore wings; the body as the hind wings.

The CATERPILLAR, according to Freyer, is gray, with paler medio-dorsal and sub-dorsal stripes; the latter is surmounted on each segment with a black spot and three or four white dots: there is a lateral stripe in the region of the spiracles, edged above with black. It feeds on the lower leaves of the lime (*Tilia europæa*), eating the green portion, and leaving the veins like a network.

The MOTH appears on the wing in September, and is not uncommon in most of the English counties, principally in the south, but extending as far north as Northumberland. I am not aware that it has been taken in Scotland but Mr. Birchall reports it from the County Wicklow in Ireland. (The scientific name is *Xanthia citrago.*)



599. The Sallow (*Xanthia cerago*).

599. THE SALLOW.—The palpi are almost concealed by the scales on the head, the terminal joint being small and naked: the fore wings are very slightly arched, and very indistinctly pointed at the tip; their colour is canary-yellow; the orbicular spot is indistinguishable; the reniform almost so, it is only rendered perceptible by its lower half being dark smoky-brown, and forming a spot in the very centre of the wing; the wing is transversely traversed by many cloudy markings of sienna-brown, inclining to purple, all of which are strongly pronounced on the costal margin, but vanish before reaching the inner margin; the position and direction of these will be seen in the upper figure: the hind wings are almost white: the head is pale canary yellow; the thorax is bright yellow and crested, it is slightly paler in front; the body is pale. The variety *Flavescens* of Esper, represented in the lower figure, is pale yellow without any of the cloudy transverse markings, but having the central spot, which—from the absence of other markings—is rendered very conspicuous.

The head of the CATERPILLAR is shining and of a ferruginous-brown colour: the second segment has a dorsal shining corneous plate nearly black with three white lines, the middle one of which is rather obscure, the outer ones very distinct; the colour of the body is violet brown, and with a medio-dorsal stripe bordered by two pale thread-like lines; there is a lateral line, of pearl-gray colour, in the region of the spiracles: it is found in early spring feeding on the catkins of the sallow (*Salix caprea*), but as it approaches its full growth it leaves the sallows, and feeds on the plants which grow near the ground.

The MOTH appears on the wing in September, and occurs in all our English counties, and occasionally also in Scotland. Mr. Birchall says it is common in the County Wicklow in Ireland. (The scientific name is *Xanthia cerago.*)



600. The Pink-barred Sallow (*Xanthia silago*).

600. THE PINK-BARRED SALLOW.—The palpi are rather long, porrected, and sharp-pointed: the antennæ are simple in both sexes: the fore wings are very slightly arched on the costa and incompletely pointed at the tip: their colour is orange-yellow: the discoidal spots are scarcely to be recognized; there are several ferruginous-purple markings on the wing; first there is a conspicuous blotch on the costa near its base, beyond which are four small spots on the costa; then a broad but broken band extending from the costa obliquely to the middle of the inner margin; there are other small spots between this band and the base of the wing, and a semi-double transverse series of similarly-coloured spots between the band and the hind margin: the hind wings are very pale, but the hind margin is decidedly tinged with yellow; the head and front of the thorax are deep ferruginous-purple; the hind part of the thorax is yellow; the body grayish yellow.

The CATERPILLAR is reddish-brown with numerous brown, red, yellow, and white dots, by which a paler lateral stripe is formed (*Freyer*). (*Stainton's Manual*, vol. i., p. 253, under the name of *Flavago.*) It feeds on the sallow (*Salix caprea*).

The MOTH appears on the wing in September, and has occurred in all our English counties, and also in Scotland. Mr. Birchall has taken it not uncommonly in the counties Wicklow and Dublin, in Ireland. (The scientific name is *Xanthia silago.*)



601. The Barred Sallow (*Xanthia aurago*).

601. THE BARRED SALLOW.—The palpi are conspicuously porrected; the antennæ are simple: the fore wings have the costal margin very slightly arched, and the tip pointed; their colour is yellow, with a ferruginous-purple band at the base, and another broadly occupying the whole of the hind margin, but interrupted throughout by a transverse waved yellow line which expands into a blotch at the tip of the wing; the discoidal spots are represented by two small and imperfectly defined ferruginous-purple marks, the orbicular being the larger and somewhat reniform, the reniform the smaller and somewhat orbicular; the hind wings are pale fulvous-yellow, with an indistinct crescentic discoidal spot, and a double bar, also indistinct, on the hind margin; the head is yellow tinged with pink; the thorax yellow, variegated with ferruginous-purple, inclining to pink; the body is of the same colour as the hind wings.

Although there is something like a description of the CATERPILLAR I cannot trust to it. M. Guenée says "it is imperfectly known." It feeds on birch (*Fagus sylvatica*).

The MOTH appears on the wing in September,

and is rather local; its principal localities are Torquay and Teignmouth in Devonshire, Weston in Somersetshire, Isle of Wight, Brighton and Lewes in Sussex, Kent, Essex, Norfolk, Suffolk, Gloucestershire, and Worcestershire. It is said to have been taken by Mr. Haughton in Ireland, but the locality is unknown. (The scientific name is *Xanthia aurago.*)



602. The Dusky-lemon Sallow (*Xanthia gilvago*).

602. THE DUSKY-LEMON SALLOW. — The palpi are inconspicuous but sharp-pointed; the antennæ are simple: the fore wings are blunt at the tip and of a pale ferruginous colour with smoky clouds; the discoidal spots are clearly defined, the lower half of the median area of the reniform being filled with smoke-colour: the smoky clouds on the general area of the wing are chiefly confined to two irregular and indistinctly defined bands, the first nearer the base than the orbicular, the second beyond the orbicular, and including the reniform; the second band is interrupted by a transverse zigzag pale ferruginous line; beyond the band there is frequently, but not invariably, a transverse series of black dots, and beyond the black dots, parallel with the hind margin, a smoke-coloured bar often broken up into black spots: the hind wings are very pale ochreous: the head and front of the thorax are pale ferruginous; the disk of the thorax is smoky; the body is of the same colour as the hind wings.

The head of the CATERPILLAR is very decidedly narrower than the second segment; it is porrected in crawling, and not notched on the crown; the second segment is smaller and narrower than the following ones: the body is smooth and almost uniformly cylindrical, but very gradually increasing to the twelfth segment, which is the largest; it is velvety, and with the segmental divisions very clearly marked; the anal claspers are small, closely approximate, and not spreading; the head is umber-brown, shading to paler brown on the cheeks, and very glabrous; the dorsal area of the body is dingy-brown, the second segment having a semicircular patch of darker brown, the convex margin of which is directed backwards, and the disk of which is interrupted by three pale longitudinal lines, with an intervening pale spot on the convex margin; between each two there is a dorsal series of subtriangular markings, all darker than the ground-colour, the apex of each pointing backward; the ventral is paler than the dorsal area, and is slightly tinged with olive-green, the division between the dorsal and ventral areas being abruptly marked, at the region of the spiracles, which are intensely black; the dorsal area and triangles are varied with linear markings, which disappear towards the period of pupation: it feeds on elm (*Ulmus campestris*).

The moth appears on the wing in September, but seems by no means generally distributed. It has been taken in some plenty in the Isle of Wight, in Worcestershire, and Staffordshire, abundantly in Derbyshire, and also in Yorkshire. (The scientific name is *Xanthia gilvago.*)



603. The Brick (*Xanthia ferruginea*).

603. THE BRICK.—The palpi are porrected but short; the terminal joint naked; the antennæ are simple: the fore wings are nearly straight on the costa, blunt at the tip, and slightly scalloped on the hind margin; their colour is ferruginous gray: the discoidal spots have a slender dark circumscription, except at the upper extremity, where it is occasionally wanting: the orbicular is more perfect than

the reniform in this respect; the lower portion of the area of the reniform is nearly black, but interspersed with gray scales, and has an appearance of being burnt; several irregular, interrupted, and inconspicuous transverse dark lines cross the wing; there is also a broad band of slightly darker brown on the hind margin, and this is traversed throughout by a very narrow pale waved line: the hind wings are pale ochreous, along the costal margin, and have a broad fringe of the same colour the median area is smoky: the head and thorax are of the same colour as the fore wings; the body is smoky, with the sides and extremity paler.

The head of the CATERPILLAR is narrower than the second segment, porrected in crawling, and not notched on the crown; the body is smooth and almost uniformly cylindrical, but gradually increases in size to the twelfth segment, which is the largest; the anal claspers are small and closely approximate; the colour of the head is umber-brown and very glabrous, the body is brown, with a medio-dorsal series of triangular markings, the points of which are directed backwards: it feeds on the buds of the sallow (*Salix caprea*) and aspen (*Populus tremula*) in April and May.

The MOTH appears on the wing in September, and is the most universally distributed of the genus; it occurs in all the English, Scotch, and Irish counties that have been investigated by entomologists. (The scientific name is *Xanthia ferruginea.*)



604. The Centre-barred Sallow (*Cirrhœdia xeram-pelina*).

604. THE CENTRE-BARRED SALLOW.—The palpi are inconspicuous, the terminal joints very small and naked; the antennæ are simple: the fore wings are slightly arched towards the tip and pointed, and the hind margin distinctly scalloped; their colour is orange-yellow, with a median band, and a hind marginal band ferruginous-purple; there is also a dot of the same colour near the base of the wing; the median band scarcely reaches the costal margin; its inner border is broadly excavated near the top, its outer border very oblique; the orbicular is wanting; the reniform only indicated in the median band; both borders of the median band are delicately pale-margined: the hind wings are very pale and slightly iridescent, they are rather darker and inclined to rosy-ferruginous towards the hind margin: the head and thorax are of the same colour as the fore wings; the body of the same colour as the hind wings.

The CATERPILLAR has been described by Guenèe, and more recently and fully by Mr. Buckler in the 42nd number of the *Entomologists' Monthly Magazine.* Mr. Buckler received two caterpillars, one from Mr. Greene, in April, 1866, and the other from Mr. Hutchinson, in May, 1867. I quote Mr. Buckler's description:—

"The first caterpillar was found before the ash-trees had put forth blossoms, and ash-buds were given it for food, into which the caterpillar ate round holes, burrowed, and devoured the interior. The second and full-grown caterpillar came after the ash had assumed its foliage, and it partook of young shoots for a few days before spinning. The caterpillar, had then attained nearly one inch and a quarter in length, and was rather broad in proportion, the head rather smaller than the next segment. Viewed sideways, it appeared tapering gradually towards the head, and from the eleventh segment to the anal extremity; but even on the back it looked of almost uniform width, excepting just at each end. The divisons deeply cut, giving each segment a plump appearance. The caterpillar, when two-thirds grown, is very suggestive of lichen, and of a lichen-feeder. Its head is shining dark gray-brown, mottled and streaked with darker blackish-brown; a black shining plate on the second segment, having two rather broad angulated whitish stripes. The back and sides are brownish-gray, delicately mottled

with a darker tint of the same. The dorsal stripe is dirty whitish, edged with black, and is on the third and fourth segments continuous but contracted and expanded, while on the others it is only visible, and expanded towards the end of each segment, excepting the twelfth and thirteenth, where it is widened into a broad blotch, extending to the sub-dorsal region, and strongly margined with black; from its base on the middle segments is a brownish-gray streak on either side, curved obliquely forward to the middle of the sub-dorsal line. The tubercular dots are whitish, delicately ringed with black, and with minute black centres, each with a short and very fine hair. The sub-dorsal line is a very thin thread of dirty whitish, delicately and interruptedly edged with black; the space between it and the spiracular region is grayish-brown, darker than the back, and having a paler blotch in the middle of each segment. The spiracular stripe is a pale freckled brownish-gray, edged above by a black line; the spiracles dirty whitish, outlined with gray, and inconspicuous. The belly and legs are a slightly mottled greenish-gray. Of the CHRYSALIS, Mr. Greene says :—"I took forty-seven in 1855, in 1856 I only met with eight. It is, perhaps, the most difficult of all chrysalids to find, and when found the most liable to be injured. The following directions may be found useful :—They are to be sought for at roots of ash; trees of good growth need only to be tried; those on the borders of streams and damp ditches will be found most productive. This insect forms a hard egg-shaped cocoon. Turn up the loose dry earth, rubbish, or moss, about or adhering to that side of the tree which faces the stream, and crumble it very carefully with the hand; should you see something resembling a cocoon of a dark muddy colour, take it up and try whether you have obtained a prize; but in this trying lies the danger. Though hard, the cocoon is extremely *brittle*, and almost the slightest pressure crushes it. The best way, therefore, when you think you have a cocoon, is to pare one end with a pen-knife as gently as possible; if, after scraping it in this manner, you find it *is* a cocoon, you have found *Xerampelina*, and may congratulate yourself. You may look for it as early as the beginning of August, certainly not later than the first week of September. I may add that Mr. Doubleday informs me that the caterpillar feeds on the seeds of ash-trees. Subsequent experience leads me somewhat to modify the above. I find it is by no means the fact that the chrysalis case is always brittle. It certainly was so in Suffolk; this may have been due to the soil. In Hampshire and Derbyshire, however, where I have taken it not uncommonly, the cocoon is soft and leathery. I am decidedly wrong in giving September as one of the months in which to find it: this is much too late. This insect, *Croceago*, and, I believe, all the species of the genus *Xanthia*, are full-fed in June. I can speak from actual knowledge of all except *Croceago* and *Aurago;* but they do not turn to the chrysalis state for four or five weeks. This presents a double difficulty to the digger: first, that of hitting the precise time when to dig, and secondly, the great danger of injuring the caterpillar if not turned, or the chrysalis if only just turned. As a rule I should recommend the last week in July as the time in which to begin. You may go on till the middle and end of August, about which time, if fortunate, you may sometimes see the insect itself, drying its wings on the trunks of the trees, about a foot from the ground. This takes place generally from about two to four p.m. Subsequent experience, however, by no means leads me to alter my opinion as to the difficulty of finding the chrysalis. I must acknowledge that it is hard, and sometimes disheartening work, but you are repaid when you see a magnificent fellow drying his wings in the breeding cage: some of the caterpillars barely enter the earth, and the most likely place for the chrysalis is among the loose rubbish, composed of bits of stick, dry roots, &c., collected round the trunks. All this should be most carefully and completely separated and examined. I may remark here that the chrysalis of all these species most closely resemble each other, and it has often been a marvel to me how such

large insects can be contained in so small a compass."

The MOTH appears on the wing in September, and has occurred in several of our English counties; between Bickleigh and Plympton station, and at Torquay in Devonshire; in Somerset, Dorset, Essex, Berkshire, Suffolk, Cambridge, Derbyshire, Yorkshire, and the Lake District: but I think not in Scotland or Ireland. (The scientific name is *Cirrhœdia xerampelina*.)



605. The Olive (*Tethea subtusa*).

605. THE OLIVE.—The palpi are rather long, porrected, and sharp-pointed; the antennæ are simple in both sexes: the costal margin of the fore wings is slightly arched, the tip scarcely produced, and not very sharp-pointed; the hind margin is slightly waved; their colour is olive-gray, the discoidal spots being delicately outlined in paler olive-gray: there are three slender transverse lines of the same colour as the circumscription of the discoidal spots, and two of these are nearer the base of the wing than the orbicular; they are almost straight, but are nearer the base of the wing at the costal than at the inner-marginal extremity; the third transverse line is very nearly straight, and is situated beyond the reniform: the hind wings, head, thorax, and body are nearly of the same colour as the fore wings, but perhaps slightly less olive, and tending to gray-brown; the fringe of the hind wings is paler.

The CATERPILLAR of this moth has been very carefully described by the Rev. Joseph Greene, who says:—"The EGGS are probably laid at the end of July and throughout August on the young twigs of poplar. The caterpillar hatches in the following spring, as soon as the young buds burst into leaf; it immediately spins two leaves together, and continues this practice during the whole of the larval state. Like some other species it effects the various changes of skin in the same situation. In confinement it appears to feed only at night. The following is a description of the full-grown caterpillar, which is not at all variable either in colour or markings: pale yellowish-green, rather glossy, not unlike the caterpillar of *Notodonta dictæa*. The dorsal stripe is broad pale yellow, much more so than the ground-colour. Spiracular line the same; along this latter is a row of black rings, somewhat oval, having a pale yellow centre. There is one such ring in the second and ten following segments; just midway between the dorsal and spiracular lines is another slender, clear yellow stripe, slightly interrupted by the segmental divisions. Head chrome-yellow, bordered with black; mouth and claspers black, slightly mottled with yellow. The caterpillar lies curled up between two leaves spun together, and in this position—when in a state of nature—may be easily detected by looking up at the leaves. CHRYSALIS subterranean, chrysalis-case weak. The caterpillar is full-grown about the end of May.

The MOTH appears on the wing in July, and has been taken now and then in most of our English counties, but I think not in Ireland. (The scientific name is *Tethea subtusa*.)



606. The Double Kidney (*Tethea retusa*).

606. THE DOUBLE KIDNEY.—The palpi are rather long, porrected, and sharp-pointed; the antennæ are simple: the costal margin of the fore wings is nearly straight, the tip produced and very sharp-pointed; the hind margin is sinuous and concave just below the tip; indeed, the tip may be described as slightly falcate; their colour is dark olive-gray, the discoidal spots being very distinctly

but delicately outlined in paler olive-gray, and the median area of each being very slightly darker than the general ground-colour of the wings; there are three slender transverse lines of the same colour as the circumscription of the discoidal spots; all of these are oblique, two of them are nearer the base of the wing than the orbicular, and both these are farther from the body at the costal than at the inner-marginal extremity; the third transverse line is situated beyond the reniform: the hind wings, head, thorax, and body are very nearly of the same colour as the fore wings; the hind wings have a paler fringe.

Mr. Hellins, who has described the CATERPILLAR in the *Entomologists' Monthly Magazine* for January, 1868, says that when full-grown it is about an inch in length, slightly tapering towards both extremities, and flat beneath; the head is small, rounded, and rather flat; the skin is very delicate and thin, so that the stripes on it show as if ribbed or raised, and the internal organs are partially seen through it: the colour is pale dull green, with a yellow tinge towards both extremities; there is a broad whitish dorsal stripe, and the slender lateral stripes of the same colour, the latter in the region of the spiracles is waved; the head is rather yellowish-green or blackish-brown, and occasionally there is a dark collar on the second segment; the young caterpillars have the usual dots very visible and black, but lose all trace of them as they grow larger: it folds and spins together the leaves and shoots of the sallow (*Salix caprea*), and resides in the domicile thus formed; it may be found by opening these retreats at the end of May and beginning of June.

The MOTH appears on the wing in August, and occurs sparingly in some of our English counties; at Exeter and Alphington, in Devonshire; at Glanville's Wootton, in Dorsetshire; in the Weald of Sussex, the Isle of Wight, Birch and Darent Wood, in Kent; Essex, Cambridgeshire; at Leominster, in Herefordshire, Worcestershire, and Yorkshire, but I believe neither in Scotland nor Ireland. (The scientific name is *Tethea retusa.*)



607. The Angle-striped Sallow (*Euperia fulvago*).

607. THE ANGLE-STRIPED SALLOW.—The palpi are very slightly porrected, the second joint very stout, the terminal joint small and pointed; the antennæ are very slightly ciliated in the male, quite simple in the female: the fore wings are scarcely arched, but decidedly pointed at the tip; their colour is ochreous; the discoidal spots and two transverse lines being clearly but very delicately defined in brown; the median area of the orbicular is uniformly ochreous, that of the reniform has a darker blotch at its lower extremity: the first of the transverse lines is bent or elbowed towards the middle, it is considerably nearer the base than the orbicular; the second is much bent, but scarcely elbowed; there is a very short line going half-way across the wing at its base; the lower part of the reniform is occupied by a dark spot, and from this to the middle of the inner margin is a slightly darker shade: the hind wings are very pale ochreous: the head and body are of the same colour as the fore wings, the body of the same colour as the hind wings; the body of the female terminates in a sharp-pointed ovipositor.

Guenée has described the CATERPILLAR as having the head fulvous-red, and the body pale green or grayish, with a medio-dorsal and sub-dorsal stripe white and continuous; there is also a whitish lateral stripe in the region of the spiracles; the warty spots are white also: the CHRYSALIS is covered with a violet-coloured bloom: the caterpillar feeds on the oak (*Quercus Robur*) and birch (*Betula alba*).

The MOTH appears on the wing in August, but is very local, having only been taken in Derbyshire, Westmoreland, and Lancashire. It occurs in Mr. Greene's List of the Lepidoptera of Ireland. (The scientific name is *Euperia fulvago.*)



608. The Heart Moth (*Dicycla Oo*).

608. THE HEART MOTH.—The palpi are curved upwards, the terminal joint being small and pointed; the antennæ are slightly ciliated: the fore wings are ample, straight on the costa, and blunt at the tip; their colour is pale ochreous-gray, with darker markings; there are two orbicular and one reniform discoidal spot; the two orbiculars are placed transversely, that is, one below the other, the lower one is flattened; all three are clearly defined in outline; there are five transverse lines, the first very short and near the base; the second zigzag and before the orbicular; the third is near the middle of the wing, is interrupted by the reniform, and is much bent; the fourth is beyond the reniform, and is also much bent; and the fifth is near the hind margin, and parallel therewith; the hind margin itself is delicately margined with the same darker colour, and the parallel wing-rays being also of that colour, the wing has a very elegant reticulated appearance; there is a smoky cloud near the base, half-way between the costal and inner margin: the hind wings are delicately pale, almost white: the head is almost white; the thorax ochreous-gray; the body is paler, and in the female terminates in a very sharp-pointed ovipositor.

The CATERPILLAR is described by Guenée as having a large head and a smooth, elongate, and rather depressed body, of a blackish-brown or reddish-brown colour, with a medio-dorsal, sub-dorsal, and lateral stripe pure white; the medio-dorsal is narrowest in the middle of each segment; the lateral stripe is tinged with brimstone-yellow, and is intersected by a black streak near each spiracle; the spiracles themselves are encircled with brown: it feeds on the young unexpanded leaves of the oak (*Quercus Robur*), which it spins together at the extremity of the twigs, and thus forms a dwelling-place, which it only leaves to undergo its transformation to a CHRYSALIS, which is enclosed in an oval cocoon on the surface of the earth.

The MOTH appears on the wing in July, and has occurred in the New Forest, Hampshire, in Kent, Essex, Cambridgeshire, and Wiltshire. (The scientific name is *Dicycla Oo.*)



609. The Dun-bar (*Cosmia trapezina*).

609. THE DUN-BAR.—The palpi are porrected, curved upwards, and approximating, the terminal joint being pointed; the antennæ are simple: the fore wings are ample, the costal margin slightly arched, the tip pointed, but not acutely so; their colour is various: pale gray, bright rust-colour, and dingy brown are the commoner colours, but there is almost every intermediate shade between them; the discoidal spots are generally distinctly outlined, and the lower portion of the median area in the reniform is usually occupied by a dark spot; there are three transverse dark lines, the first short and near the base; the second very oblique, and having a white or very pale interior border; the third much bent, and having a white or very pale exterior border; beyond this, and parallel with the hind margin, is a pale line with a series of rather coarse dark spots on its interior border, and terminating on the costa in a dark shade: the hind wings are gray-brown, with a pale fringe; the head and thorax are of the same colour as the fore wings; the body of

the same colour as the hind wings, and tufted at the extremity in the males.

The female lays her EGGS on oak (*Quercus Robur*) in August, and less commonly on hornbeam (*Carpinus betulus*); the CATERPILLARS abound in the following May, particularly from the middle to the end of the month, and beginning of June. Although, doubtless, occasionally feeding on leaves, they seem to prefer animal food, devouring with great greediness the caterpillars of other *Lepidoptera*, particularly those of the winter moth (*Cheimatobia brumata*), which absolutely swarm in our woods, forests, and gardens during the entire month of May and the beginning of June. It neither feigns death nor rolls in a ring when rudely dislodged by the beating-stick, but falls at full length into the umbrella, amid a shower of the other caterpillars which the same stroke has also dislodged: in this predicament it instantly catches sight of the first caterpillar that ventures to crawl, and starts in immediate pursuit, and an exciting race ensues, in which the *Cosmia* is not always the victor, the *Cheimatobia* sometimes escaping through sheer superiority of speed: the carnivorous caterpillar, however, generally gains the day, and it is curious to observe that he does not seize the leaf-feeder by the hinder part of the body, but never slackens his pace until his head is abreast of the other's neck, which he then seizes with savage eagerness, reminding one strongly of a deerhound pulling down a stag, or at least of the representations of this cruel feat by the inimitable Landseer. When the first paralysing grip is given, it is all over with the leaf-feeder; there is scarcely a struggle; the *Cheimatobia* submits to its fate, and the *Cosmia* continues his repast, until one wonders at his power of consumption: when introduced into the collecting-box with any other caterpillars, a somewhat similar scene ensues, but the chance of escape for the leaf-feeder is gone, and his destruction is inevitable: I have rarely, if ever, opened a box in which a *Cosmia* and *Cheimatobia* have been enclosed together, without finding that the latter has fallen a prey to the former. The head of the *Cosmia* caterpillar is manifestly narrower than the body, very glabrous, and porrected in crawling; the body is obese, slightly narrowed at the anterior extremity, and slightly swollen on the back of the twelfth segment. The colour of the head is dusky semihyaline green; the body is pale dull green, with numerous small warts, and five equidistant pale, almost white, stripes extending its entire length; these stripes are often tinged with yellow or yellow-green, and the outer or lateral stripe is often bordered with dark smoke-colour along its upper margin; the warts are jet-black and each is surrounded by a ring of pure white, and emits a rather conspicuous bristle; on each segment there are usually eight of these warts; on the second, third, and fourth segments they are arranged in a straight transverse series, but on the following segments, namely, the fifth to the twelfth inclusive, four of them are arranged almost in a square on the back, and two below them on each side; the medio-dorsal stripe is narrow, but very distinct; the next on each side is still narrower, irregular, and interrupted; the exterior or lateral stripe is much wider than the others, and very distinct; it includes all the spiracles, except the first and ninth; the upper margin of this wide stripe is sometimes bordered with black, which merges abruptly in the general ground-colour: the ventral surface, including the legs and claspers, is delicate apple-green, with a semitransparent appearance. It changes to a CHRYSALIS in a slight web on the surface of the earth: the chrysalis is of a brown colour, covered with a beautiful bloom like that on a ripe Orleans plum.

The MOTH appears on the wing in July, and occurs in all the English, Scotch, and Irish counties that have been investigated by entomologists. (The scientific name is *Cosmia trapezina*.)

Obs.—The presence or absence of the delicate bloom on the chrysalids of this family of moths is very interesting, and not unfrequently forms an excellent character by which to separate nearly allied species from each other.



610. The Lunar-spotted Pinion (*Cosmia pyralina*).

610. THE LUNAR-SPOTTED PINION.—The palpi are porrected and curved upwards, the terminal joints being slender and pointed; the antennæ are simple: the fore wings are scarcely at all arched on the costa, and square at the tip; their colour is rich reddish-brown, the discoidal spots being scarcely perceptible, but there is a white crescent on the costal margin near its apical angle, its cusps pointing towards the hind margin; nearer the middle of the wing is a transverse and much elbowed white line; and nearer the base, a transverse waved pale line; parallel with the hind margin is a compound transverse line, uniting with the crescentic mark already described: the hind wings are smoky-gray with a somewhat rosy fringe: the head and thorax are of the same colour as the fore wings, the body as the hind wings.

The CATERPILLAR is pale green, the medio-dorsal and sub-dorsal stripes being paler green; the spiracular line is yellowish, edged above with black; the spots yellowish-green; the head dark green (*Freyer*). It feeds on plum and pear (*Stainton's Manual*, vol. ii. p. 258).

The MOTH appears on the wing in August, but is very local; Mr. G. C. Green found it very abundant at Modbury, in Devonshire; it has also been taken in Dorsetshire, Wiltshire, Sussex, Kent, Suffolk, Worcestershire, and Derbyshire. (The scientific name is *Cosmia pyralina*.)



611. The White-spotted Pinion (*Cosmia diffinis*).

611. THE WHITE-SPOTTED PINION.—The palpi are porrected and curved upwards, the terminal joint being slender and pointed; the antennæ are simple: the costal margin of the fore wings is almost straight, the tip blunt; their colour is red-brown, the discoidal spots being scarcely perceptible; there are four white marks on the costa; the first is near the base of the wing and linear; the second is triangular at its commencement, then bends slightly towards the body, and then unites with a pale line which descends to the middle of the inner margin; the third is large and triangular at the costa, and unites at its apex with a pale transverse line which at first bends towards the hind margin, and then rather abruptly descends to the inner margin; the fourth is linear, or slightly crescentic, and combines with a third pale transverse line parallel with the hind margin: the hind wings are gray-brown with pale fringe: the head and thorax are of the same red-brown colour as the fore wings, the body of the same gray-brown colour as the hind wings.

The head of the CATERPILLAR is black and shining; the body is nearly cylindrical, but the anterior extremity is more slender, a character very evident when this part of the body is stretched out to its full extent: its colour is pale apple-green, with medio-dorsal and lateral stripes dingy-white; there is a second stripe on each side in the region of the spiracles of a pale yellow; it feeds on elm (*Ulmus campestris*), and is full-fed the beginning of June, when it spins a slight cocoon either on the trunk of the elm or between two leaves.

The MOTH appears on the wing in July, and occurs rather commonly in the southern counties of England, in Worcestershire, Derbyshire, and Yorkshire. (The scientific name is *Cosmia diffinis*.)



612. The Lesser-spotted Pinion (*Cosmia affinis*).

612. THE LESSER-SPOTTED PINION.—The

palpi are very decidedly curved upwards, the terminal joint small and pointed; the antennæ are simple: the fore wings are very slightly arched on the costa, blunt at the tip, and scalloped at the anal angle; their colour is cinnamon-brown, mottled and marbled with darker brown; the discoidal spots are pale cinnamon-brown, the reniform assuming the appearance of a figure of eight, the two median areas thereof being black spots; the orbicular has one such black spot, and there is a very similar cinnamon-brown and black central mark between the orbicular and the costal margin; there are four gray transverse lines, all of which are inconspicuous; the first is short and very slender, and it is situated near the base of the wing; the second is also slender, and situated before the orbicular; the third is beyond the orbicular, is much bent outwards in the middle, and expands into a gray cloud on the costal margin; the fourth is parallel with the hind margin, and expands into a gray cloud on the costal margin: the hind wings are black, but slightly paler towards the base, and the pale portion contains a dark crescentic discoidal spot; the fringe is orange: the head and thorax are dull orange-brown; the body is blackish-brown, with delicate orange rings: the disk of the under surface of all the wings is black, with a broad orange margin.

The CATERPILLAR is described by Guenée as having the head of a pale green-colour, the body much attenuated anteriorly and flattened below; the segments distinctly divided and somewhat rhomboidal in form: the colour is a beautiful glaucous-green, with a broad and continuous medio-dorsal stripe of a pure white; there is also a sub-dorsal and a lateral stripe, both of which are narrower than the medio-dorsal, but like that, uninterrupted and pure white; the lateral stripe is below the spiracles, which are black, but encircled with white: the legs and claspers are pale green: it feeds on the elm (*Ulmus campestris*), the leaves of which it binds carelessly together with a few silken threads: the CHRYSALIS is short and covered with a violet-coloured bloom.

The MOTH appears on the wing in July, and has occurred in several English counties. Mr. Reading gives a number of Devonshire localities, and it seems not to be uncommon in Somersetshire, Dorsetshire, Isle of Wight, Kent, Essex, Suffolk, Norfolk, Hereford, Worcester, Shropshire, Derbyshire, and Yorkshire, and Mr. Birchall, met with it at Powerscourt, in Ireland. (The scientific name is *Cosmia affinis.*)



613. The Dusky Sallow (*Eremobia ochroleuca*).

613. THE DUSKY SALLOW.—The palpi are porrected, the second joint slender but scaly, the scales almost entirely concealing the very small terminal joint; the antennæ of the male are ciliated with short hairs, each separate hair being recurved, those of the female are simple: the fore wings are straight on the costa, rounded at the tip, and waved on the hind margin; their colour is dull ochreous-brown with darker brown markings; the discoidal spots are scarcely to be distinguished; the reniform is contained in, and confused with, a pale costal blotch; the orbicular is contained in, and confused with, a larger and darker costal blotch nearer the base of the wing; opposite this latter is a smaller dark blotch near the middle of the inner margin; there is a series of dark crescentic spots on the waved hind margin of the wing, and the fringe contains two series of corresponding spots: the hind wings have much the same colour as the fore wings, but the paler tint is confined to the base and fringe, the darker tint forming a broad but vague hind-marginal band: the head, thorax, and body are pale ochreous-brown, the head and front of the thorax being very pale ochreous.

The CATERPILLAR is described by Guenée as having a large head of a pale red-colour, and an elongate cylindrical body, with the usual

wartlike spots prominent, and each bearing a hair or bristle on its summit; the colour is yellowish-green, with a lateral stripe in the region of the spiracles of a bright yellow; the warts and their accompanying hairs are black: the claspers are pale red: it feeds on grasses in dry places, and turns to a CHRYSALIS in the ground.

The MOTH appears on the wing in July; it is a very local species, occurring only at Brighton and Lewes, in Sussex; at Bristol; in Suffolk, and in Yorkshire. (The scientific name is *Eremobia ochroleuca.*)



614. The Tawny Sheers (*Dianthœcia carpophaga*).

614. THE TAWNY SHEERS.—The palpi are porrected, the second joint being clothed with rough unequal scales, which frequently conceal the small terminal joint; the antennæ are almost simple in both sexes: the fore wings are very straight on the costa, and rather blunt at the tip; their colour is various, in some specimens pale ochreous-brown, often approaching to white, in others dark bistre-brown; in all, the discoidal spots are conspicuous and well defined; in one specimen in my possession there is a very obvious median darker band, and this contains the two discoidal spots; parallel with the hind margin is a zigzag pale line, adjoining which and pointing towards the base of the wing are two or three wedge-shaped dark-brown spots: the hind wings are pale dingy brown at the base, and have a broad dark band on the hind margin; this is frequently preceded by a slender transverse line: the head, thorax, and body partake of the general tint of the wings.

The EGGS of this variable species are laid on the calyx or corolla of the bladder campion (*Silene inflata*), and the young CATERPILLAR emerging in about a week, gnaws a minute hole in the capsule, and, entering through the aperture, takes up its abode in the interior until it has consumed the whole of the seed, and then emerging, seeks another capsule and empties that of its contents in the same manner; when grown so large as to be unable to conceal itself in one of the capsules, it generally descends to the ground during the day, ascending to the flower-heads only during the night. On examining the flower-heads with a lantern at night, the caterpillars may frequently be found with the head and anterior segments concealed in the capsule, and the remainder of the body very obviously exposed to sight: when full grown, the head is exserted, the face rather flat, glabrous, and of a reddish-brown colour, with four darker longitudinal lines; the body is cylindrical, smooth, and plump, the divisions of the segments being very clearly marked; its colour is greenish-gray, with a broad medio-dorsal, and narrower sub-dorsal and lateral stripes dingy white: when full-fed it descends finally to the ground, and burying itself in the earth, and there forming a very slight cocoon, changes to a CHRYSALIS of a reddish-brown colour, the case containing

the legs and antennæ being prolonged below those containing the wings.

The MOTH appears on the wing in June: it occurs in most of our English counties, and the name occurs in the Irish lists. (The scientific name is *Dianthœcia carpophaga.*)



615. The Pod-lover (*Dianthœcia capsophila*).

615. THE POD-LOVER.—The palpi are porrected, the second joint being clothed with bristly scales, which conceal the small terminal joint; the antennæ are almost simple in both sexes: the fore wings are rather ample, very straight on the costa, and rather blunt at the tip; their colour is dark bistre-brown, with numerous pale and clearly-defined markings; the two discoidal spots are very distinct; each has a very pale circumscription and a dark median area; there are four pale transverse lines, the first very near the base, and very short; the second before the orbicular, oblique and waved; the third beyond the reniform, and much bent; and the fourth parallel with the hind margin, and zigzag. These pale lines have black borders, which make them very conspicuous; all the markings are sharp and clearly defined; the hind wings are light dingy brown at the base, and have a broad dark brown marginal band, preceded by a slender waved line: the head and thorax are richly varied with different shades of gray and brown; the body is gray-brown.

The EGG is laid on the seed-pods of the sea campion (*Silene maritima*), and the young CATERPILLAR enters the capsule and feeds on the seed; as it increases in size it devours the walls of the capsules, and even the calyx. When full-fed it rolls itself into a ring, and feigns death if removed from its food. The head is small, porrected in crawling, glabrous, and beset with scattered hairs. The body is obese, smooth, and cylindrical. It is slightly attenuated towards each extremity. The head is pale, semi-transparent brown, and has a few hairs; the ocelli are black, and there is a black dot at the base of each hair; the body is pale wainscot-brown, with five paler longitudinal stripes: the most conspicuous of these is medio-dorsal; the widest is lateral, and includes the spiracles, which are pale in the centre, but bordered with black. Exactly intermediate between the medio-dorsal and the spiracular lateral stripe is one less conspicuous and rather narrower than either. The dorsal surface of the second segment is glabrous, subcorneous, and darker brown; but the medio-dorsal stripe passes distinctly through this darker portion. The belly, legs, and claspers are very pale. These caterpillars were full-fed on Midsummer-day. I am indebted to Mr. Birchall for a supply, which I fed on the bladder campion (*Silene inflata*) in the absence of their proper food-plant. They became pale brown CHRYSALIDS on the 11th of July.

The MOTH appears on the wing early in June, and has hitherto only been found in Ireland on the Hill of Howth and at Waterford, and in the Isle of Man. (The scientific name as adopted in England is *Dianthœcia capsophila.*)

Obs.—Mr. Birchall, in his "List of Irish Lepidoptera," appends this note to his mention of *Dianthœcia capsophila*:—"There has been much discussion as to the claims of this insect to be considered a species distinct from *Carpophaga*, some of the darker varieties of which from Scotland approach *Capsophila* both in form and colour. The caterpillars of *Carpophaga* and *Capsophila*, like the perfect insects, differ principally in colour: *Capsophila* in both cases being darker. The caterpillars of *Capsincola* and *Conspersa* are, however, equally difficult to separate; and these slight variations in the caterpillar state seem to be characteristic of the *Dianthœciæ*, and alone are insufficient to enable us to discriminate the species. So we may suppose that the common origin of the various species of the genus is indicated by these slight differences in the caterpillar state; but for the purpose of classification *Carpophaga* and *Capsophila* seem to me abundantly distinct,

and must be so recorded." But subsequently —writing to me on the 24th of this present October—Mr. Birchall adds: "This insect is the Irish representative of *D. carpophaga*, and in my opinion only a variety of that species, and reaches its extreme point of divergence from the English and continental type in the Isle of Man. The difference between *Capsophila* and *Carpophaga* is wholly one of colour, and only exists in the perfect insect, the caterpillars and chrysalids presenting no difference. As we travel northward in Great Britain there is a gradual deepening of the shade of colour from the clay-coloured almost immaculate *Carpophaga* of the southern counties to the rich brown specimens obtained in Argyleshire. Amongst the Irish *Capsophila* an occasional dark brown specimen occurs, but the colour of the majority is dark gray, and the Manx specimens are usually still darker, sometimes almost entirely black. The explanation seems to be that the species has reached Ireland by way of Scotland, and that the effect of insular conditions has been still further to increase the divergence from the original type of the mainland. As respects its natural history, the Isle of Man is certainly an outlying province of Ireland, in many respects *Hibernior Hibernicis*. *Capsophila* occurs on the Irish coast from Belfast to Waterford, but I have not seen or heard of it on the Western coast, or in the interior of Ireland. There have been records of its capture in North Wales, but I have not seen the specimens, and cannot say whether they ought to be referred to *Carpophaga* or *Capsophila*." This species was first discovered by Anderegg, in Switzerland. Guenée gives "Alps of the Valais, neighbourhood of Digne," and "Spain," as the continental habitats; and he describes the Spanish form "as much darker than the Swiss, and almost black, with the transverse lines very white and slender, the wing-rays powdered with white, and the underside very dark." This seems to militate against the opinion expressed above by Mr. Birchall; and it is a remarkable fact that the most northern and most southern examples of the species are the darkest.



616. The Lychnis (*Dianthœcia capsincola*).

616. The Lychnis.—The palpi are porrected, the terminal joint very small and inconspicuous; the antennæ are simple in both sexes: the fore wings are nearly straight on the costa, blunt at the tip, and slightly waved on the margin; their colour is umber-brown with sharply-defined paler markings; the discoidal spots have a distinct pale circumscription, and they are connected at the lower extremity by a pale wing-ray; there is a very irregular but very distinct pale line parallel with the hind margin: the hind wings are smoky-gray, the basal area being much paler with the exception of the wing-rays: there is a white spot near the hind margin, and nearer the anal than the apical angle: the head and thorax are variegated like the fore wings; the body is dorsally crested, and is tufted at the extremity in the male; in the female it is conical, and terminates in a long and sharp-pointed ovipositor.

The caterpillar rolls in a ring when touched: the head is rather small; the body is smooth and attenuated at both ends: the colour of the head is pale brown, and very shining: of the body dingy brown, and opaque, with a very slight indication of a medio-dorsal stripe, and having each segment marked on the back with a somewhat obscure smoke-coloured V-shaped mark, the apex of which points towards the posterior extremity; near its apex each V encloses a small transverse bar of its own colour, and at each extremity of each bar is a nearly circular dot,

still of the same colour; the spiracles are black, and immediately above each is a slight swelling. It feeds on the seeds of the white campion (*Lychnis vespertina*), and makes a perfectly round hole in the capsule, and usually feeds with half its body hanging out of the hole: it is full-fed in the beginning of October.

The MOTH appears on the wing in August, and is widely distributed in England, Scotland, and Ireland. (The scientific name is *Dianthœcia capsincola.*)

Obs.—The extraordinary specimen represented in the lower figure was kindly lent me for this work by Mr. Bond.



617. The Campion (*Dianthœcia Cucubali*).

617. THE CAMPION.—The palpi are porrected, the terminal joint small and inconspicuous; the antennæ are simple in both sexes: the fore wings are ample, nearly straight on the costa, blunt at the tip, and slightly waved on the hind margin; their colour is umber-brown, beautifully overlaid with purple reflections; the discoidal spots have a distinct pale circumscription; both of them are oblique, and the obliquity is in different directions—thus they recede from each other at the upper, and approach at the lower, extremity, so much so, indeed, as in some instances to be united: there is a pale zigzag and interrupted but well-defined line parallel with the hind margin; the hind wings are gray-brown, rather paler at the base; the head and thorax are variegated like the fore wings; the body plain gray-brown like the hind wings; the body is crested, but neither conspicuously tufted in the male nor conspicuously pointed in the female.

The CATERPILLAR has a flattened and glabrous head, and a smooth cylindrical body, which has the divisions of the segments very distinctly marked. The colour of the head is greenish-gray, with four slender dark lines down the face; the body is greenish-gray, tinged with reddish-orange, especially on the anterior segments. There are three dark dorsal stripes on the second, third, and fourth segments, after which the middle one alone appears, and the lateral ones are replaced by an oblique brown line on every segment, as far as the eleventh inclusive. Every segment has, moreover, a number of ocellated white dots. The ventral is greener than the dorsal area. It feeds on the flowers and seed-pods of the bladder campion (*Silene inflata*), and is full-fed in August, when it descends to the ground, and spinning a very slight cocoon, changes to a CHRYSALIS.

The MOTH appears on the wing in June. It is found in nearly all our English counties, extending even into Scotland; and Mr. Birchall says it occurs not uncommonly at Howth and Killarney in Ireland. (The scientific name it *Dianthœcia Cucubali.*)



618. The White Spot (*Dianthœcia albimacula*).

618. THE WHITE SPOT.—The palpi are very inconspicuous, scarcely projecting beyond the tuft of scales which covers the crown of the head; the antennæ are simple in both sexes: the fore wings are straight on the costa, and rounded at the tip; their colour is smoky-black, tinged with olive, and they have sharply-defined black and white markings; the discoidal spots are conspicuous, but rather small; both of them have a broad white circumscription, and a transverse central shade of the ground-colour; beneath the orbicular is a pure white square spot, and from this there projects a lobe towards the lower extremity of the reniform: there are four white spots in two pairs at the base of the costal margin, and several others on the costa itself, particularly two just above the orbicular; three transverse lines conspicuously black and white cross the wing; the first is about half

way between the base and the orbicular; this is almost direct; its white portion is on the inner, its black portion on the outer side; the second is much elbowed and zigzag; it is situated beyond the reniform, and has the white portion outside, the black inside; the third is very zigzag, and very sharply defined; the white portion is outside, the black inside; the fringe is spotted with black and white: the hind wings are smoky-black, with paler base, and a white spot near the anal angle; the fringe is pale: the head and thorax are variegated like the fore wings; the body is smoke-coloured, the basal segments crested, the crests tipped with black.

The CATERPILLAR is ochreous-yellow; the medio-dorsal line dark gray, with oblique lines proceeding from it on each segment; a row of black spots on each side; subdorsal line pale gray (*Gu.*). It feeds on the Nottingham catchfly (*Silene nutans*). *Stainton's Manual*, vol. i. p. 262.

The MOTH appears in June. There is a specimen in the late Mr. Stephens' collection, said to have been taken in Birch Wood, Kent, in 1816, and from this my description is made; a second is reported in the *Entomologist's Monthly Magazine* for 1865, p. 237, as having been taken at Gosport. Its occurrence in these localities is very remarkable from the entire absence of the food-plant. (The scientific name is *Dianthœcia albimacula*.)



619. The Marbled Coronet (*Dianthœcia conspersa*).

619. The MARBLED CORONET.—The palpi are scarcely porrected, the second joint very scaly, the terminal joint scarcely perceptible; the antennæ are very slightly serrated in the males, quite simple in the females: the fore wings have the costal margin almost straight, the tip blunt, the hind margin slightly waved; their colour is smoky-black, with creamy-white and sharply-defined markings; the orbicular is creamy-white, and in some specimens has a slight smoky cloud in its median area; in other specimens this cloud is entirely wanting. This orbicular spot is often continued to the costal margin, and is frequently united to a pure white blotch in the middle of the wing. The reniform is white, with a smoky cloud in its median area; there are several white spots at the base of the wing, and several others on the inner margin, particularly a large one opposite the reniform; there is also a transverse zigzag and interrupted white line parallel with the hind margin, which terminates in a white blotch on the costal margin; there is a scalloped black line on the hind margin; the fringe is whitish, with a double series of smoky or blackish markings; the hind wings are smoke-coloured, the base and fringe being rather paler; the wing-rays and discoidal spot rather darker; and there is a small pale spot near the hind margin, and nearer the anal than the apical angle: the head is white, with two dark lines on the crown, the thorax is variegated with black and white like the fore wings; the body is smoky-gray like the hind wings.

The EGGS are laid on the flowers or calyces of the ragged Robin (*Lychnis Flos-Cuculi*), and the young CATERPILLAR feeds on the seeds. For a while it is concealed entirely within the seed-pod; but as it grows larger it is compelled to leave this very limited residence, and may afterwards be generally found with its head and anterior segments in the capsule, and the rest of the body exposed. When full-fed the head is narrower than the second segment and very glabrous, the face rather flattened, the crown not perceptibly notched; the body is smooth and almost uniformly cylindrical, but gradually and very slightly increasing in size from the second to the tenth

segment; the colour of the head is pale wainscot-brown, with four slender and rather darker lines down the face; the body is also wainscot-brown, with a dorsal series of ten darker V-shaped markings; the apices of the V's pointing towards the anal extremity; a very narrow pale medio-dorsal stripe passes through all these, intersecting each V at its apex; there is also a black dot on each side of each V near its apex: it has two lateral stripes rather darker than the ground-colour, but still very pale; and below the lowermost of these is a third stripe paler than the ground-colour—indeed almost white; this contains the spiracles, which are pink encircled with black; the ventral surface is pale flesh-colour, tinged more or less with yellow; the legs and claspers are of the same colour as the ventral area: when full-fed it finally descends to the ground, and constructs a rather imperfect cocoon of silk and earth just below the surface, and in this changes to a CHRYSALIS, which is rather long and slender, the wing-cases being detached and projecting at their extremity, the body conical and terminating in two sharp diverging spines; its colour is bright reddish-brown, the tip and spines being black.

The MOTH appears on the wing in June; it is by no means an abundant species, but has nevertheless been obtained in most of our English and Scotch counties, and Mr. Birchall informs me it occurs at Howth in Ireland. (The scientific name is *Dianthœcia conspersa*.)

Obs.—The so-called "black" *Conspersa*, taken in Ireland in company with the usual form by the late Mr. Weaver, and sold for so high a price, would probably now be referred to the next species: I thought the late Mr. Stephens was a purchaser of these, but do not find them in the British Museum. The beautiful specimen represented in the lower figure was kindly lent me for this work by Mr. C. Fenn. It seems highly desirable, now that a question has been raised as to the identity of this and the next species, that entomologists should endeavour to procure an extensive series whenever practicable.



620. Barrett's Marbled Coronet (*Dianthœcia Barrettii*).

620. BARRETT'S MARBLED CORONET.—The palpi are scarcely porrected; the second joint is very scaly, the scales unequal and having a rough appearance, the terminal joint is scarcely perceptible; the antennæ appear rather incrassated in the male, quite simple in the female: the fore wings have the costal margin almost straight, the tip blunt, and the hind margin slightly waved; their colour is dingy brown with a somewhat metallic tinge of ochreous-olive; there are many markings both darker and lighter, but all of them are obscure; both discoidal spots are to be traced without difficulty, both of them are slightly paler than the ground-colour, and both have a median shade; the orbicular is rather oblong and rather oblique; they are apparently almost connected at the lower extremity by a blotch of their own colour, occupying nearly the middle of the wing; there are several pale markings at the base of the wing, and others on the inner margin, more particularly a large one nearly opposite the reniform; there is also a paler blotch at the tip of the wing, and these two blotches are connected by a transverse, bent, and interrupted zigzag line which is parallel with the hind margin; the fringe is spotted with the shades of the ground-colour: the hind wings are smoke-coloured, the base and fringe being rather paler; the wing-rays and two narrow transverse waved lines are rather darker, and there is a small linear whitish spot near the hind margin, and

nearer the anal than the apical angle: the head and thorax are dingy olive-brown, the latter sprinkled with a few gray scales; the body is dull gray-brown.

The MOTH appears on the wing in June and July; it was first taken in the neighbourhood of Dublin by Mr. Barrett, and subsequently by Mr. Birchall and other entomologists. (The scientific name is *Dianthœcia Barrettii.*)

Obs.—This moth was first described by Mr. Doubleday, at p. 124 of the *Entomologist's Annual* for 1864. That excellent lepidopterist concludes the description with these words: "It cannot possibly be confounded with any other British species;" and I know from recent correspondence, that he still entertains the same view. Had it not been for my friend's very decided opinion, I should have supposed *Barrettii* to be a suffused, darker, and local (Irish) type of *Conspersa*, from which it widely differs in the tint of colour and in the obscurity of its markings, but neither in the form, size, or number of those markings. Mr. Birchall, who is more thoroughly acquainted with the species than any other entomologist, writes thus respecting it:—"Until the early states of this insect are known, I hesitate to express an opinion as to whether it is specifically distinct from *Conspersa*, or only a melanic form of that insect. Beyond the difference of colouring, the generally somewhat larger size and rougher aspect, and the occurrence of a dark spot in the centre of the orbicular stigma of *Barrettii*, I am unable to point out any character by which the two insects (so unlike at first glance) can be distinguished. The under-surface of the wings is alike in both species, even in colour. Irish specimens of *Conspersa* are somewhat darker than English, but I have not seen any that very closely connect it with *Barrettii* in general aspect. *Barrettii* has hitherto only been observed at Howth, where also *Conspersa* occurs, but more rarely. Oct. 21, 1868.—EDWIN BIRCHALL."

On the same subject, Mr. Bond, in compliance with my request, gives me his opinion thus:—"I am hardly prepared to say that *Barrettii* is a species; if I had only seen the figure in the Annual for 1864, I should have said it was only *Conspersa* without doubt. In the two fine specimens you showed me, I quite failed in finding the *Genista*-like marks which Mr. Doubleday mentions in his original description; and had I only seen the female specimen in your possession, I should have said it was a dark variety of *Conspersa*. I well recollect, some years ago, the late Mr. Weaver bringing over from Ireland three or four very dark specimens of *Conspersa*, but who had them, I do not know, and, at present, I have failed to trace them; I have four specimens of his taking, which are much darker than any other specimens I have ever seen. October 22, 1868. —FREDERICK BOND."

I have thus brought together the rather conflicting opinions of our three English macro-lepidopterists. It may be noted that the differences hitherto observed between *Barrettii* and *Conspersa* are, *first*, the slightly stouter antennæ of the male in *Barrettii; secondly*, the rather broader fore wings; *thirdly*, the obliquity of the orbicular; and, *fourthly*, the more obscure coloration: it remains to be seen whether the first, second, and third of these differences will hold good in a long series of each; if that prove to be the case, *Barrettii* must, I think, be admitted as a distinct species.



621. The Gray (*Dianthœcia cœsia*).

621. THE GRAY.—The palpi are porrected and very scaly, the terminal joint is very small; the antennæ are simple: the fore wings are rather narrow, the costa very straight, the tip rather produced but blunt; their colour is uniform dull bluish-gray, the various markings—as discoidal spots and transverse lines—being slightly indicated but never defined: the hind wings are smoky: the head and thorax are dull bluish-gray, the body smoky-black.

Mr. Gregson having watched a female of this moth depositing her eggs on the flowers of the bladder campion (*Silene inflata*), in the Isle of Man, gathered the flowers, and has succeeded in obtaining caterpillars, which, being full-fed on the 6th of July, he has most kindly transmitted to me for description. The usual position of the caterpillar is with the head and anterior extremity of the body concealed within the capsule or inflated calyx, and the anal claspers tenaciously holding the slender footstalk of the flower. The head is of nearly the same width as the second segment, somewhat glabrous, and emits about twenty minute bristle-like hairs: the body is almost uniformly cylindrical and velvety; it has a few short and slender bristle-like hairs along each side, but these are so few and inconspicuous as only to be observed under a lens of considerable power. The colour of the head is pale wainscot-brown, slightly reticulated with darker brown markings, in one specimen so slightly as only to be observable under a lens; there is a blackish dot at the insertion of each hair, and the ocelli are also dark: the body is pale brown, and very minutely and densely irrorated with umber-brown; these irrorations are crowded in some parts, but more distant in others, leaving a doubled longitudinal series of irregular pale patches, which form two indistinct stripes; the ventral surface, including legs and claspers, is pale smoky-brown slightly tinged with pink.

The MOTH appears on the wing in June, and has been taken somewhat abundantly in the Isle of Man, and a single specimen in Ireland. (The scientific name is *Dianthœcia cœsia.*)



622. The Small Ranunculus (*Hecatera dysodea*).

622. THE SMALL RANUNCULUS.—The palpi project very slightly, their terminal joint is imperceptible; the antennæ are very slightly ciliated in the male, quite simple in the female: the fore wings have the costal margin very straight, the tip blunt, the hind margin slightly waved; their colour is smoky-gray, mottled with both darker and lighter markings, and having a rather darker median band, not very clearly defined, and in which are situated the discoidal spots, which are also indistinct; each wing is adorned with numerous orange spots, six or seven of which form a transverse series parallel with the hind margin; there is one on each side of the reniform, one on the outside of the orbicular, two at the base of the wing, and two on the inner margin: the hind wings are blackish-gray, with the basal area and fringe paler, the wing-rays and discoidal spots rather darker; there is also a whitish longitudinal streak near the anal angle: the antennæ are testaceous, approaching to ochre-colour; the head is gray; the thorax is gray, with two conspicuous approximate orange spots, rather behind the middle, and two smaller and more distant orange spots behind these; the body is gray.

The CATERPILLAR feeds on the blossoms and seed of the common lettuce: it rests in a straight position on its food-plant, but falls to the ground when disturbed, and, tucking the head under its body, embraces it with the ventral claspers, the anal extremity, together with the anal claspers, remaining extended; the head is glabrous, scarcely notched on the crown, narrower than the second segment, into which it is partially received: the body is cylindrical, but slightly attenuated towards both extremities; the anal claspers are spreading; the colour of the head is pale dull olive-green, inconspicuously reticulated with darker lines: the body is pale dull olive-green, sometimes exhibiting a shade of gamboge-yellow; the dorsal and ventral areas are abruptly divided on a level with the spiracles, which are intensely black; the dorsal is slightly darker than the ventral area, and having also three darker, but nevertheless very inconspicuous, stripes; one of these is medio-dorsal, and intersected throughout by a slender paler stripe; the others are lateral and immediately above the spiracles: the legs and claspers are concolorous with the ventral area When full-fed it descends to the ground, and changes to a

CHRYSALIS just beneath the surface of the earth.

The MOTH appears on the wing in July, and although abundant in certain localities, can by no means be regarded as generally common: it has been taken in Somersetshire, Dorsetshire, Sussex, Kent, Essex, Norfolk, Suffolk, and Cambridgeshire. (The scientific name is *Hecatera dysodea.*)



623. The Broad-barred White (*Hecatera serena*).

623. THE BROAD-BARRED WHITE. — The palpi are very slightly porrected, the terminal joint concealed; the antennæ are slightly ciliated in the male, simple in the female; the fore wings are very slightly arched on the costa, blunt at the tip, and slightly waved on the hind margin; their colour is white; the costal margin conspicuously spotted with black, and they have a dark median band, so much broader at the costal than at the inner margin as to appear almost triangular; this band includes both the discoidal spots, which are white, with a darker central shade; there are several black spots at the base of the wing: the hind wings are pale at the base, the pale area being traversed by dark wing-rays, and there is a broad band of smoky-brown along the hind margin, and in this bar are two whitish spots, one near the apical, the other near the anal angle: the head and thorax are gray, mottled with black; the body gray.

The CATERPILLAR rests in a straight position on its food-plant, but falls to the ground when disturbed, and, tucking its head under the body, embraces it with the ventral claspers, the anal extremity, together with the anal claspers, remaining extended: the head is glabrous, scarcely notched on the crown, narrower than the second segment, into which it is partially received; it emits a few slender bristles: the body is cylindrical, but slightly attenuated towards both extremities; the anal claspers are spreading; there are a few minute warts, each of which emits a fine bristle, scattered about the body; the colour of the head is dull pale greenish-brown; of the body, dingy yellow-green, the dorsal and ventral areas being divided by a very distinct yellow-green stripe, extending from the head to the anal claspers; this stripe is immediately below the spiracles, which are testaceous-brown, surrounded by a very delicate black ring; the second segment has a quadrate smoky-black dorsal patch, longitudinally intersected by a pale line; it is also bounded on both sides by a similar pale line; the dorsal area of the other segments is sprinkled with smoky-black, which forms itself into a kind of dorsal ornamentation, consisting of a medio-dorsal and two lateral series of blotches; all these markings are very obscure, but there are two dorsal dots placed transversely on the back of each segment, which are distinct and constant; the ventral area is sprinkled above the claspers, but is perfectly unicolorous, and of a more decided green below them; the legs and claspers are concolorous with the ventral surface: it feeds on the blossoms of the corn sow-thistle (*Sonchus arvensis*), the common sow-thistle (*S. oleraceus*), and the wild lettuce (*Lactuca virosa*), and in confinement it feeds freely on the flowers of the cultivated lettuce. When full-fed the caterpillar descends to the ground and changes to a CHRYSALIS just below the surface of the earth: this change takes place at the end of August.

The MOTH appears on the wing in June and July, and is not uncommon in the southern counties of England, particularly in Kent, in which county I once found forty, or perhaps fifty specimens at rest on the trunk of a pollard ash, in the lane leading to Darent Wood. Mr. Birchall took it in the county Wicklow, and at Howth in Ireland. (The scientific name is *Hecatera serena.*)

Obs.—The broad dark median band from which this species has been named, gives it a remarkable and beautiful appearance when at rest: it would form a valuable feature in a cabinet if one of each species could be preserved in this natural position of rest.



624. The Gray Chi (*Polia Chi*).

624. THE GRAY CHI.—The palpi are scarcely porrected beyond the head, and the terminal joint is extremely small and inconspicuous; the antennæ of the male are slightly ciliated, those of the female simple; the fore wings have the costal margin nearly straight, but slightly curved towards the tip; their colour is white or whitish-gray, with numerous darker markings; the discoidal spots have a dark circumscription, but a whitish median area, with a slightly darker shade in the centre; below the discoidal spots and equidistant from both, is a black mark in the shape of a Greek chi χ, which gives its name to the species: the hind wings of the male are pure white, with a delicate marginal black line; those of the female are clouded with smoke-colour, especially near the hind margin, and on the wing-rays: the head, thorax, and body are pale gray, almost white. There is a beautiful local variety, in which the ground-colour of the fore wings is a delicate olive-green, interrupted by four transverse series of pure white spots, the first very short and close to the base; the second nearly direct, but zigzag; it is situated before the middle of the wing; the third very much bent, and situated beyond the middle of the wing; and the fourth is oblique and parallel with the hind margin. The discoidal spots are rather obscure.

The EGGS are laid in the autumn, and hatched in the spring, from the 17th to the 31st of March. When the CATERPILLAR is full-fed its head is slightly porrected, and about equal in width to the second segment; the body is smooth and almost uniformly cylindrical, but slightly decreasing in size towards both extremities: the colour of both the head and body is glaucous-green; the dorsal paler than the ventral area, and interrupted by three slender white stripes, the mediodorsal stripe being the least distinct of the three; the dorsal area is bounded, on a line with the spiracles, by a narrow black stripe, the upper margin of which melts, through delicate gradations of olive-green, into the pale glaucous-green of the back, but its lower margin is bounded by a very distinct and rather broad pure white stripe; the belly, legs, and claspers are glaucous-green; the spiracles are pure white, surrounded by a black ring on the third and fourth segments: in an exquisite drawing by Mr. Buckler, kindly lent me by Mr. Hellins, are represented black dots exactly in the place occupied by spiracles in the spiracle-bearing segments. In reference to these abnormal markings, which may be called false spiracles, Mr. Buckler observes:—"I have seen similar markings on the larvæ of other *Noctuæ*, but very rarely; and I may here mention that in some of the more dingy-coloured *Noctuæ* I have had varieties in which the spiracles have not been visible by any distinction of colour or markings, while in other individuals of the same species they will be most distinct; these aberrant markings on the third and fourth segments are remarkably large on some of the *Cucullie* when they do occur." Since Mr. Buckler wrote this he has had the kindness to send me a caterpillar of *Anchoscelis pistacina*, in which this peculiarity is very apparent. The caterpillar of *Polia Chi* feeds on the whitethorn (*Cratægus oxyacantha*) and sallow (*Salix caprea*), and when full-fed, which is about the middle of May, it descends to the ground, and

undergoes pupation beneath the surface of the earth.

The MOTH appears on the wing in July, August, and September; it is decidedly a local insect: in Devonshire it occurs at Plymouth, Torquay, Teignmouth, and Modbury; in Herefordshire, at Leominster, where the caterpillar feeds on that familiar plant the tea-tree (*Lycium barbarum*), frequently completely stripping it of its leaves. Mr. Stainton reports it from Stowmarket, in Suffolk; Mr. Horton from Worcester; several entomologists have taken it in Staffordshire, Derbyshire, Cheshire, and thence northwards to nearly all parts of Scotland; and Mr. Birchall says it is common and generally distributed in Ireland. (The scientific name is *Polia Chi.*)

Obs.—The beautiful variety mentioned above is described as a species by Mr. Stephens (*Illus. Haust.*, vol. iii. p. 325), under the name of *Olivacea;* but I scarcely incline to consider it distinct.



625. The Black-banded (*Polia nigro-cincta*).

625. THE BLACK-BANDED.—The palpi are but slightly porrected and the terminal joint almost concealed; the antennæ of the male are very slightly ciliated, those of the female simple: the fore wings are slightly arched on the costa, blunt at the tip, and slightly waved on the hind border; their colour is whitish-gray, with a median but somewhat interrupted black band, which includes both the discoidal spots; these are of the pale gray ground-colour, with a darker transverse shade in the centre, but neither of them is clearly defined; the rest of the general area of the wing is thickly sprinkled with black dots and markings, interspersed with a few minute orange dots: the hind wings are pure white in the male, with a very slender black marginal line; they are very dark in the female: the head is nearly white: the thorax mottled-gray, with black dots: the body very pale gray, almost white.

The CATERPILLAR has been found by Mr. Greening, feeding on the campions (*Silene*), the sea pink (*Statice Armeria*), violet, and common harebell (*Campanula rotundifolia*): when nearly full-fed, and in confinement, it will eat almost anything. In appearance the caterpillar is very similar to that of *Epunda lichenea*, and would at once be taken for that species by anyone who was not thoroughly acquainted with *Lichenea*. It is full-fed about the middle of July: it then goes down and spins a tolerably compact cocoon, in which it changes to a CHRYSALIS.

The MOTH appears on the wing at the end of August or beginning of September, and is very common in some parts of Hungary and France; but very few specimens have been recorded as British: the first is mentioned by Mr. Doubleday, at p. 349 of the third volume of the *Entomologist*, as having been taken in the caterpillar state by Mr. Greening, in the Isle of Man, feeding on the bladder campion; the second specimen is recorded by Mr. Hopley, in the forty-second number of the *Entomologist's Monthly Magazine;* this specimen was taken during daylight, by Mrs. Fisher, from off the window of a lighthouse, near Padstow, in Cornwall, about the middle of August, 1862; and several caterpillars and one moth have been taken by Mr. Greening in the Isle of Man, during the present year (1868). Mr. Greening, who has kindly furnished me with all the information I possess respecting this species, says: "It is very sluggish in the daytime, but when on the wing in the evening it flies quick and strong. I sugared for three nights, but did not take a specimen; and I think it just possible that it will not come to sugar, but I have scarcely had a fair chance, as the wind was blowing a gale the whole time." (The scientific name is *Polia nigro-cincta.*)

Obs.—It is much to be regretted Mr. Greening did not describe the caterpillar.



626. The Large Ranunculus (*Polia flavocincta*).

626. THE LARGE RANUNCULUS.—The palpi are slightly porrected, the terminal joint being slender, but very perceptible ; the antennæ are almost simple in both sexes ; the fore wings are very slightly arched on the costa, blunt at the tip, slightly waved on the hind margin, and very slightly scalloped at the anal angle ; their colour is smoky-gray, marbled and mottled with darker markings ; there is a series of six or seven orange spots parallel with the hind margin, and on each of these rests a black arrow-head pointing towards the base of the wing ; there are also four transverse orange marks in the median area of the wing, one on each side of each discoidal spot, and the two innermost of these orange markings are united at the base : the hind wings are dingy smoke-colour in the male, darker in the female ; in both sexes they have two transverse bars of a darker shade parallel with the hind margin : the head and thorax are gray, the body more inclined to smoke-colour.

The EGGS are laid in October and hatch in the spring ; the caterpillars feed on chickweed (*Stellaria media*), groundsel (*Senecio vulgaris*), on various species of mint, and many other herbs ; they are full-fed in June and July. The full-fed caterpillar rests in almost a straight position, with the head slightly tucked in, but falls off its food-plant and forms a rather loose ring when annoyed. The head is manifestly narrower than the body, and partially retractile within the second segment ; the body is uniformly cylindrical, smooth, and velvety ; the colour of the head is pale opaque-green, with black ocelli : the body is pale apple-green, inclining to glaucous, and sprinkled with minute white dots ; there is a narrow median stripe on the back, slightly darker than the ground-colour, but very indistinct ; along each side is a very slender white stripe passing below the spiracles, but just touching them ; this is bordered above by a very narrow and interrupted black stripe, particularly observable between the first and second spiracles, and having a conspicuous black dot behind the second, third, fourth, fifth, and sixth spiracles : the spiracles are dingy-yellow, bordered with black : the legs are almost colourless ; the claspers pale transparent green. When full-fed the caterpillars enter the earth to change to CHRYSALIDS.

The MOTH appears on the wing in September : it is common near London, and is generally distributed in the southern counties, but has not been met with in the north. It occurs in the county Wicklow, in Ireland. (The scientific name is *Polia flavocincta*).



627. The Deep-brown Dart (*Epunda lutulenta*).

627. THE DEEP-BROWN DART.—The palpi are very short and inconspicuous ; the antennæ pectinated in the male, simple in the female ; the fore wings are straight on the costa ; their colour is smoky black-brown, the discoidal spots being scarcely distinguishable from the ground-colour : in many of the females there is a distinctly darker broad median band ; the hind wings are pure silvery white in the males, smoky-brown in the females ; the head and thorax are of the same colour as the fore

wings; the body smoky-gray, paler at the base.

The head of the CATERPILLAR is almost exactly of the same width as the second segment, very smooth and shining; the body is smooth and almost uniformly cylindrical, but tapers slightly towards either extremity; the colour of the head is green; the second segment of the body has a semicircular dorsal green plate, the remainder of this segment, as well as the entire dorsal surface of the third and fourth segments, being rosy red; the dorsal area of the remaining segment is apple-green, interrupted by a narrow medio-dorsal stripe of a pale brown, which deepens to a dark brown at the interstices of the segments; there is a broad rosy lateral stripe, the lower border of which is bounded by a narrow stripe of pure white, and below this a narrow rosy stripe; the ventral surface is pale green, with the legs and claspers concolorous. It feeds on gromwell (*Lithospermum arvense*), and several other plants, more especially in woods. The EGGS are laid in October, and the young CATERPILLARS hybernate very small, and feeding again in the spring, are full-fed at the end of April, when they spin rather slight cocoons just under the surface of the earth. The cocoon is composed of silk and grains of earth. The CHRYSALIS is dark red-brown and very shining, the wing-cases being of yellowish-green colour; and the extremity of the body is furnished with two long and closely approximate spines.

The MOTH appears on the wing in September; some specimens, taken about the middle of September, and kindly brought me by the Rev. P. H. Jennings, were quite worn, and appeared to have been out some time. It seems to be abundant in Devonshire, in which county Mr. Reading records Plymouth, Whitsands, Stadden Heights, Devonport, Torquay, Teignmouth and Alphington as localities. It also occurs in the New Forest, and Isle of Wight, Brighton, Lewes, Darent Wood in Kent, Cambridgeshire, Gloucestershire, Worcestershire, and Cheshire; and Mr. Birchall, since the publication of his list, has taken it in Ireland. (The scientific name is *Epunda lutulenta*.)



628. The Black Rustic (*Epunda nigra*).

628. THE BLACK RUSTIC.—The palpi are slightly porrected, and rather blunt at the tip; the antennæ are rather long, slightly thickened in the male, simple and slender in the female: the fore wings are slightly arched towards the tip, and slightly scalloped on the hind-margin; their colour is rich dark sepia-brown, slightly clouded; the discoidal spots are indicated, and there is a transverse series of whitish scales on the exterior border of the reniform; with this exception, both spots are of the same colour as the general area of the wing: the hind wings are silvery white in the male, with a slightly clouded hind margin in the female; the hind wings are conspicuously clouded with smoke-colour, except at the base: the antennæ, head, and thorax are almost pure black; the body smoke-colour, but paler on the sides at the base.

In No. 7 of the *Entomologist* Mr. Hammond gives a short description of the CATERPILLAR. When full-grown they were about an inch and a half in length, cylindrical, of nearly uniform thickness, with the head rounded and but little smaller than the second segment; the anal segment was tapering.

Mr. Buckler subsequently described four varieties in the *Entomologists' Monthly Magazine*, as follows:—

Var. 1.—The ground-colour is a brilliant pale yellow-green, sometimes a very bright grass-green, others of a bright olive-green, deepest in tint at the extremities, and often

suffused with pink anteriorly, the dorsal broad stripe in some being faintly blackish, in others reddish, but intensely black or red forming a dark mark just at the beginning of each segment; in others this dark spot is confluent with the two anterior tubercular large black dots, thus forming blunt arrow-head marks pointing forwards; the sub-dorsal stripe of red or blackish is sometimes complete, but oftener interrupted in the middle of each segment; the skin-folds at the incisions are bright yellow; the spiracles in all varieties are white, placed in semicircular black marks, and immediately beneath them is a narrow stripe of pale sulphur-yellow or of greenish-yellow; the belly and legs are pale green, tipped with red at their extremities; the tubercular dots are sometimes absent, but when visible are black, and the anterior pair very much larger than the pair behind them: the head is green, suffused with pink; a dull pinkish plate on the second segment. One olive-green caterpillar had the plate dark red, and a large crimson spot on the top of each lobe of the head.

Var. 2.—The ground-colour is cinnamon-brown; a narrow pale greenish stripe beneath the spiracles; the folds of the skin at the segmental divisions grayish; the dorsal stripe faintly indicated by a dusky spot at the beginning of each segment; the sub-dorsal stripes more distinct and faintly blackish.

Var. 3.—Deep dingy crimson on the back and sides; below the spiracles is a greenish-yellow stripe; the belly and legs, with the head, and dull plate on the second segment, rather paler than the back; a broad dorsal and narrow sub-dorsal stripe of faint blackish, but just at the beginning of each segment quite black.

Var. 4.—The whole of the back between he subdorsal lines a brilliant deep citron-yellow, the sides from the sub-dorsal to the lines of spiracles of the same ground-colour, but almost entirely suffused with dark red: the head and thoracic segments, with the anal extremity, also suffused with red; the dorsal stripe composed of two red confluent lines forming a broad stripe, with blunt arrow-head shapes of red at the beginning and end of each segment, and anteriorly margined with short black streaks; the tubercular dots black, the anterior pairs being much the largest; sub-dorsal line black, and interrupted in the middle of each segment; the spiracles are white in semi-linear blotches of black, and edged below by a pale greenish-yellow stripe; belly greenish, with a large red blotch along the sides above the legs, the latter being orange-red.

It feeds upon the great hedge bedstraw (*Galium mollugo*), and is full-fed at the end of May and beginning of June.

The MOTHS do not appear on the wing until September and October, and the species seem to be very local; in Devonshire it occurs at Plymbridge, Ivybridge, Totnes, Kingsbridge, St. German's, Saltash, Torquay, Teignmouth, and Alphington; in Somersetshire, in the Isle of Wight, New Forest, Lewes, and in the Lake District; it is also recorded from Banff, in Scotland, but not from Ireland. (The scientific name is *Epunda nigra.*)



629. The Minor Shoulder-knot (*Epunda viminalis*).

629. THE MINOR SHOULDER-KNOT.—The palpi are slightly porrected and pointed; the antennæ are slightly pectinated in the male, simple in the female; the fore wings are straight on the costa and rather produced at the tip; their colour is silvery gray, clouded with darker gray; there is an almost square costal blotch of the paler colour at the base of the wing, and this is bordered below by a black line; the discoidal spots are also pale,

but each has a dark centre : in many specimens I have received from the North of England, the darker colour is diffused over the whole wing, as represented in the lower figure : the hind wings are pale gray in the male, smoky-gray in the female : the body is of nearly the same colour as the wings.

The EGGS are laid in August, but are not hatched until the spring : the plants usually selected by the female are two species of *Salix*, *S. caprea* and *S. cinerea*, both familiarly known by the name of sallow : on both these species the CATERPILLARS feed, previously spinning together the edges of some of the leaves, and constructing a kind of imperfect tent, in which they are concealed from birds. The caterpillar is full-grown at the beginning of June ; it then rests in a tolerably straight position, and if disturbed falls from its food-plant, curled up into a very lax and imperfect ring, and remains motionless for many minutes ; the head is rather small, decidedly narrower than the body, and porrected in crawling : the body is smooth and velvety, almost uniformly cylindrical, but evidently attenuated towards both extremities, and having the ventral flatter than the dorsal surface ; the colour of the head is almost white, having an extremely slight tint of green, and being finely reticulated on the cheeks with a darker colour ; it also has black mandibles, a straight black transverse line just above the mandibles and labrum, and a black margin where received into the second segment ; this black margin is only observable when the caterpillar is crawling : the body is pale glaucous-green, with five still paler but scarcely white equidistant dorsal stripes ; the broadest of these is medio-dorsal, and, together with the next on each side, extends from the head to the extremity of the anal flap ; the exterior stripe on each side passes just below the spiracles, touching all of them except the ninth ; the spiracles are perfectly white, encircled with a black ring ; between the medio-dorsal and the next stripe is a series of about thirty small circular spots, or rather dots, of exactly the same colour ; there are three on each segment, the middle one being nearest the medio-dorsal stripe : each has a minute black dot in the centre, and from the black dot emanates a very slender bristle : the ventral surface and claspers are concolorous with the back ; the legs paler and almost transparent, and encircling the base of each in a black ring, which emits two spreading branches anteriorly. The caterpillars in my possession were full-fed the first week in June, when they spun up in leaves that had fallen on the earth at the bottom of the breeding cage.

The MOTH appears on the wing at the end of June and during the whole of July, and has been taken in most of our English counties, and also in the Highlands of Scotland : Mr. Birchall reports it from Belfast and Killarney, in Ireland. (The scientific name is *Epunda viminalis*.)



630. The Feathered Ranunculus (*Epunda Lichenea*).

630. THE FEATHERED RANUNCULUS.—The palpi are porrected, their acutely-pointed tips projecting very slightly beyond the head ; the antennæ are decidedly pectinated in the male, simple in the female ; the fore wings are straight on the costa almost to the tip, very slightly scalloped on the hind margin ; their colour is a mottled mixture of green, gray, and ochreous ; the discoidal spots are perceptible, but not conspicuous ; both partake of the mixed colours which surround them ; the orbicular is generally small and circular, and has a dark centre and pale circumscription ; the wings have three transverse zigzag lines, or rather zigzag series of pale spots, each

pale spot being often accompanied by a darker one; the first of these series is before the orbicular, the second and third beyond the reniform; the hind wings of the male are very pale gray, with a crescentic discoidal spot, a transverse interrupted median line, and an interrupted hind-marginal series of linear spots, all darker; the wings of the female are smoky-gray, with faint indications of the same markings as in the male; the head, thorax, and body are nearly of the same colour as the fore wings.

The EGGS, which are laid about the beginning of October, hatch early in November; the CATERPILLARS remain very small during the winter, and are mostly hidden amongst roots of grass. About the beginning of January they begin to exhibit themselves at night, and soon feed very ravenously on groundsel, &c., and grow rapidly. They are of a green colour, with a whitish stripe along the spiracles; they retain the green colour after several moults, when they appear in a mottled olive suit. When young they repose in the position of the privet hawk-moth (*Sphinx Ligustri*), with their head and fore legs erect, on the stems of dry grass. As the spring advances they will feed on chickweed, dock, dandelion, scabious, burnet, &c., until May, when they assume the CHRYSALIS state. Mr. Dell, who has paid great attention to rearing the species, says: "I never had any remain in the caterpillar state until June; out of many dozens during two or three years' experience of rearing them, I never saw any above the surface after May. I do not by any means think them a tender caterpillar to rear; I have during the last two or three years reared about three-fifths of them on an average. They form a cocoon of a web-like texture, mixed with the earth; the chrysalids are rather blunt at the ends; they generally lie in that state for about four months. My method of rearing them is this; in a clear wide-mouthed glass bottle I put the eggs, also a piece of white paper, and cover over the top of the bottle with a fine piece of gauze, so that when the caterpillars hatch I can see them creep on the paper; I then put in some dry stems of fine grass and a small leaf of groundsel, so that there should not be too much refuse left; they soon leave their food and creep on the fine grass to repose, and I then remove the refuse; every evening I put in fresh food, and always remove what they leave; but after awhile, when they improve in size, I remove them to a medium-sized flower-pot, half filled with loose mould and pieces of turfy grass, under which they generally hide by day, and at night they come out to feed, when I put in some fresh leaves: in clearing out the refuse care must be taken not to throw away any of the caterpillars which may be hid in it. By following these instructions I think there would be no difficulty in rearing these caterpillars."

To this I must add a description of the full-fed caterpillar. The head is obviously narrower than the body, extremely shining, but emitting several slender hairs; the body is uniformly cylindrical, obese, and smooth, but emitting a very few, very distant, short and fine hairs; these are only discernible under a lens. The head is olive-brown, tesselated with paler markings. The body is dull olive-brown on the back, pale transparent olive-green on the belly, and having a paler stripe dividing the two colours, and including the spiracles; the back has a series of somewhat lozenge-shaped oblique paler marks, the whole of these markings being obscure and indistinct, yet, viewed together, constituting a dark median stripe, with a paler and interrupted stripe on each side; the legs are shining, the claspers opaque, both pellucid, and of a yellow-green colour.

The MOTH appears on the wing in August, but seems to be a very local species; it is plentiful in Devonshire, where Mr. Reading records its occurrence in gardens and on street lamps at Woodside, North Hill, Plymouth Hoe, Crabtree, Plymbridge, Tavistock, Torquay, Teignmouth, and Alphington; it occurs in Dorsetshire, in the New Forest, and Isle of Wight, and at Birkenhead in Cheshire; and Mr. Birchall informs us it is common at Howth, in Ireland. (The scientific name is *Epunda Lichenea.*)



631. The Green-brindled Dot (*Valeria oleagina*).

631. THE GREEN-BRINDLED DOT. — The palpi are porrected and rather ascending, very scaly, with the exception of the terminal joint, which is almost naked, slender, and pointed; the antennæ are decidedly pectinated in the male, slightly so in the female: the fore wings are straight on the costa, blunt at the tip, and scalloped on the hind margin; their colour is olive-brown, interspersed with scales of bright metallic green, which impart a greenish lustre to the whole wing; both the discoidal spots are distinct, the reniform remarkably so, being large and pure white, with the exception of a few scattered brown scales near each extremity; the orbicular, which is much smaller, is outlined in white, and has a brown median area; parallel with the hind margin is a zigzag line, almost white and not very distinct; on the margin itself is a series of seven black crescents; and in the fringe, alternating with these crescents, are seven short white lines: the hind wings are pale gray at the base, and have a broad smoke-coloured band occupying the hind margin; and this band is interrupted throughout by a compound bar, the interior portion of which is white, the exterior black: above the marginal band, but rather below the middle of the wing, is a waved transverse black line: the antennæ are pale testaceous-brown; the head and thorax are densely scaly, and of the same confused olive-brown colour as the fore wings; the body is crested, and of a smoky-brown colour, with paler sides.

The head of the CATERPILLAR is garnished with hairs; it is very large, and yet seems almost buried in the second segment, which projects beyond it on all sides; the second, third, and fourth segments are all very stout, and appear particularly so when the caterpillar is in a state of repose, from their being crowded together, when the divisions between them entirely disappear; the segments following the fourth are much narrower; the wart-like spots are rather prominent, and each emits a bristle from its summit; the warts on the twelfth segment are very prominent and conical: the colour of the head is bluish-gray, its hairs white; the body is gray or brown, with an orange-coloured neck, which is adorned with a transverse series of black dots; there is a broad dorsal black spot, becoming white at its extremity, on the fourth and fifth segments; there is also a blackish and interrupted medio-dorsal stripe; the wart-like dots are generally black, and connected with each other by waved blackish lines; some of these, however, on the sides of the caterpillar, are orange: it feeds on the black-thorn (*Prunus spinosa*), principally in shady places, and on the skirts of woods: when full-fed it descends to the ground, and forms an irregular cocoon of silk and earth, in which it changes to a CHRYSALIS.

The MOTH appears on the wing in March and April; it seems to be a very rare species in this country. Haworth says, *in Anglia rarissima, etiam in Wallia.* I know of no capture since the publication of the "Lepidoptera Britannica," in 1803. (The scientific name is *Valeria oleagina.*) The description of the caterpillar is copied from the French of M. Guenée.

Obs.—I believe there is no ground for doubting the capture of this beautiful moth in Wales: several specimens occur in the older British collections which from time to time come under the hammer, and they are always set in the customary English fashion, and with English pins; at that early period, the setting-boards which are now so commonly used by beginners, and which flatten out the partially folded character of the hind wings, had not been invented. Few of our English entomologists adopt the old fashion of setting insects with card braces beneath the wings, but Mr. Doubleday is one of them, and his specimens are always distinguishable for the perfectly natural elegance of the shape. The specimen of this moth in the collection

under my care is from the late Mr. Haworth's cabinet.



632. The Green-brindled Crescent (*Miselia Oxyacanthæ*).

632. THE GREEN-BRINDLED CRESCENT.—The palpi are densely scaly at the base, the terminal joint slender and pointed; the antennæ are slightly thickened in the male, simple in the female: the fore wings are rather arched, their hind margin rather scalloped, their colour dull-brown, somewhat inclining to reddish-brown, marbled and sprinkled with metallic-green scales; the discoidal spots are defined, but so nearly of the same colour as the general area as to be inconspicuous; the reniform is placed longitudinally; at the base of the wing is a black longitudinal streak, which passes through a black transverse line, and then ceases; parallel with the hind margin is a broadish pale band, and the interior border of this is accompanied by a delicate waved white line, which expands into a conspicuous white mark before it reaches the inner margin: in a variety of frequent occurrence, which I have represented in the lower figure, the fore wings are of a nearly uniform dark-brown colour, the white mark being thus rendered very conspicuous: this is called the "dark crescent" by Haworth; the hind wings are smoky-gray: the head and thorax are gray-brown; the body of nearly the same colour, and crested, the crests being darker.

The CATERPILLAR neither feigns death nor rolls in a ring when disturbed; the head is exserted, rather wider than the second segment, and slightly notched on the crown; the body is cylindrical, and exhibits the divisions of the segments plainly; the twelfth segment is elevated, but scarcely humped dorsally; it bears two pairs of small warts, the posterior pair rather larger and rather wider apart than the anterior pair: the colour of the dorsal surface is either brownish-gray or red-brown, very dull, and has four white dots on each segment; the medio-dorsal and lateral stripes are scarcely perceptible; the ventral surface is gray-green, with a conspicuous medio-ventral dark stripe; the legs and claspers are green: it feeds on black-thorn (*Prunus spinosa*), white thorn (*Cratægus oxyacantha*), and is full-fed at the end of May, when it spins a thick cocoon on the surface of the earth, in which it changes to a CHRYSALIS: the eyes of the chrysalis shine very brightly for the last fourteen days of its remaining in that state.

The MOTH appears on the wing in September, and is of very frequent occurrence in England, Scotland, and Ireland. (The scientific name is *Miselia Oxyacanthæ*.)



633. The Marvel-du-Jour (*Agriopis Aprilina*).

633. THE MARVEL-DU-JOUR.—The palpi are pointed at the tips; the antennæ simple, but rather stouter in the male; the fore wings are pale green, ornamented with black and white markings, the black markings often forming something like a median band; the discoidal

spots are distinct, and always white, with green centres, bounded by black: the hind wings are smoky black, with a darker discoidal spot, a lighter median transverse line, and a hind-marginal white line; the fringe is smoke-colour, with six white spots: the head and thorax have the same colour as the fore wings; the body is smoke-colour, slightly paler at the base.

The head of the CATERPILLAR is shining, and of a greenish-gray colour, with a black cross, resembling the letter X, on the face, the body stout, cylindrical, and of a greenish-gray colour, sometimes tinged with red; the dorsal area is dark, and interrupted by a series of lozenge-shaped markings of the same pale green gray, which is the general ground colour, there is a pale stripe in the region of the spiracles, bounded above by a somewhat waved darker stripe. It feeds on oak (*Quercus Robur*), and is full-fed in June, when it descends the trunk, and entering the earth, constructs an earthen cocoon a considerable depth beneath the surface, and therein changes to a CHRYSALIS, of which Mr. Greene says it occurs "in the utmost profusion. I have taken as many as twenty at one tree. This will be one of the first chrysalids found by the beginner; nothing can be easier; merely turn up the earth and break it, and they will tumble out of their brittle cocoons in plenty."

This extremely beautiful MOTH appears on the wing in October, and is very common in England and Scotland, also in the counties of Dublin and Wicklow, in Ireland. (The scientific name is *Agriopis Aprilina.*)



634. The Angle Shades (*Phlogophora meticulosa*).

634. THE ANGLE SHADES.—The palpi are slightly porrected and connivent at the extremity; the second joint is cup-shaped and contains the very small terminal joint; the form of the united palpi reminds one of the mandibles of some coleopterous insect; the antennæ are very slightly ciliated in the male, simple in the female: the fore wings are arched towards the tip, and very deeply scalloped on the hind margin, particularly on the lower half thereof; they are folded longitudinally in repose; their colour is ochreous or wainscot-brown, often tinged with olive-green; the two discoidal spots are very similar in shape; both are oblique but in different directions, separating at the upper, and approaching and actually connivent at the lower extremity, they are separated by a dark V-shaped mark, the apex of which is directed towards the inner margin of the wing; all these markings are enclosed in a larger V, the base whereof occupies the middle third of the costal margin, and the apex thereof touches the middle of the inner margin: the hind margin of the hind wings is also scalloped and produced into a decided tooth at the apical angle; their colour is ochreous-gray, tinged with pink towards the hind margin, and having two darker waved transverse and parallel bars: the head, antennæ, thorax, and body are pale wainscot-brown.

The CATERPILLAR when touched or annoyed feigns death, turning its head on one side of the body, and I have sometimes seen it form a complete ring; the form is somewhat leech-like, the head small, the second, third, and fourth segments are gradually larger, those following much larger, the twelfth gibbose, but not humped on the back; smooth, velvety; the colour of the head is pale obscure green, semihyaline, and reticulated with darker lines; the colour of the body is apple-green or olive-brown; in either case it is densely sprinkled with very obscure whitish dots; there is an interrupted very narrow median white line on the back, and a broader, obscure whitish line on each side just below the spiracles, better defined on the twelfth and thirteenth segments, and terminating in the anal claspers; the spiracles are whitish, surrounded by a delicate black line; the legs and claspers semihyaline-green; it feeds throughout the

winter months on groundsel (*Senecio vulgaris*), the cultivated chrysanthemums, primrose, and a variety of low-growing herbs; it spins a slight web on the ground in April or May, and changes to a smooth brown CHRYSALIS.

The MOTH appears in May or June, and a second brood is out in September; it is common everywhere. (The scientific name is *Phlogophora meticulosa*.)



635. The Flame Brocade (*Trigonophra empyrea*).

635. THE FLAME BROCADE.—The palpi are slightly porrected and pointed, they are distinctly separated; the antennæ are very slightly ciliated in the male, quite simple in the female; the fore wings are nearly straight on the costal margin, scalloped on the hind margin, and reflected on the inner margin; their colour is rich umber-brown, with a purplish gloss suffused over the basal and median areas; the orbicular spot is small, it is indicated in outline, and the median area frequently contains a second smaller circle in outline, but both are inconspicuous; the reniform, on the contrary, is large, slightly oblique, almost white, and very conspicuous; it contains two parallel slender brown lines, which are generally united at both extremities; the lower extremity of the reniform emits a wedge-shaped dash of its own white colour, and directed towards the base of the wing; parallel with the hind margin of the wing is a broad pale band; the reflexed inner margin is almost white: the hind wings are smoky-brown, paler at the base, and have a darker crescentic discoidal spot: the head and thorax are dark brown, the body smoky-brown, reddish towards the extremity.

The EGGS are laid in September and October on the leaf stalks of pile-wort (*Ranunculus Ficaria*), on the shining leaves of which the CATERPILLAR feeds: they are not generally hatched for two or three weeks, and then eat but little, making very small holes in the leaves of the pile-wort; I cannot, however, find that there is anything like hybernation, except, perhaps, during hard frost, when most caterpillars become torpid: the caterpillars are full grown in April and May. It rests in a nearly straight position on the leaf-stalks of the pile-wort, but falls off, and rolls in a ring on being disturbed: the head is smooth, shining, and narrower than the second segment; the body is velvety, nearly uniformly cylindrical, but with the dorsal surface of the twelfth segment rather swollen. The colour of the head is fulvous-yellow, reticulated with brown, and there are two longitudinal streaks of brown on the face. The body in some specimens is grayish-yellow, in others grayish-dove-coloured, and again in others green, or blue-green. The first of these is the most common, and has the markings most distinct; but in each of the others the markings are to be traced, although they are very inconspicuous; there is a medio-dorsal series of rather darker lozenge-shaped markings, placed point to point, and connected by a rather paler slender medio-dorsal stripe, which passes through the entire series. On each side the series of lozenges is a slender stripe just touching their lateral points; each of the dorsal lozenges has four white dots, and each dot has a black anterior margin; one of these white dots is situated at each outer angle of the lozenge, and another half way between this and the anterior point; the lateral narrow stripe which touches the lateral angles of the lozenge is succeeded by a broad stripe, and this has two white dots on its lower border in each segment; the spiracles are yellow, delicately surrounded with black: the legs are pale, dingy flesh-colour, with brown tips; the claspers are of the same colour, with brown disks. When full-fed, it makes a loose cocoon of grains of earth and silk, and therein changes to a CHRYSALIS of a deep shining red colour, and having a projection at the tip, which is armed with two slender spines, which are rather distant at the base, but curve slightly inwards, and approach at the tips.

The MOTH appears on the wing in September and October, and seems to be common in one or two localities on the south coast of Sussex, as near Brighton and near Lewes, but has not been taken elsewhere. (The scientific name is *Trigonophra empyrea.*)

Obs. 1.—The prior name of this species is *Flammea:* it is the *Noctua flammea* of Esper, Borkhausen, and Engramel: it has been changed to avoid conflicting with another *Noctua* of the same name. I am indebted to Boisduval's "Collection des Chenilles" for my description of the caterpillar.

Obs. 2.—I can find no affinity between this species and *Meticulosa*, with which it has been associated; both the caterpillar and perfect insect agree better with the genus *Hadena:* when placed between *Meticulosa* and *Lucipara* it seems to dissever a very natural alliance.



636. The Small Angle-Shades (*Euplexia lucipara*).

636. THE SMALL ANGLE-SHADES.—The palpi are rather long, decidedly porrected, and widely separated; the antennæ are slightly ciliated in the male, quite simple in the female: the fore wings are nearly straight on the costa, and scalloped on the hind margin; their colour is rich umber-brown, with a paler transverse band between the reniform and the hind margin, and this band is intersected throughout by a slender brown line; the orbicular is scarcely to be traced; it is large, nearly devoid of outline, and nearly of the same colour as the general area; the reniform is large, conspicuous, and almost white, with a darker linear shade in the middle: the hind wings are smoke-coloured, rather paler at the base, and having the rays and a discoidal spot rather darker; they have several waved lines parallel with the hind margin, which is distinctly scalloped: the head and thorax are dark brown, the body smoky-brown, and very decidedly crested.

The CATERPILLAR rolls in a very rigid ring when touched. The head is shining, pale, pellucid-green; the body gradually tapers towards the head, but increases in size towards the anal extremity, rising almost into a hump on the twelfth segment; its colour is opaque, but delicate green on the back, gradually paler on the sides until this colour merges in a white stripe below the spiracles; the belly below this white stripe is of a more intense green than the back; on each side is a series of rather darker oblique lines than the rest of the back, these are very indistinct; meeting on the back they combine to form indistinctly-pronounced V-shaped markings, pointing backwards, and their apices meeting on a central very narrow paler stripe: there are two conspicuous white dots on the twelfth segment, and other less observable on various parts of the body. It feeds on the common brakes (*Pteris aquilina*), and sometimes on the male fern (*Dryopteris Filix-mas*). Mr. Doubleday has occasionally found it on nettles.

The MOTH appears on the wing in June and July, and is universally distributed in Great Britain and Ireland. (The scientific name is *Euplexia lucipara.*)



637. The Green Arches (*Aplecta herbida*).

637. THE GREEN ARCHES.—The palpi are porrected and scarcely at all curved upwards; the second joint is densely scaly, the third somewhat pointed; the antennæ are almost simple in both sexes: the fore wings are slightly curved on the costal, and slightly waved on the hind margin; their colour is gray-green interspersed with numerous sharply defined black markings and a few white ones,

which give it a variegated appearance; the discoidal spots are outlined in pure black, but their median area is so nearly filled up with the ground-colour as to render them inconspicuous: there is a large pale blotch outside the reniform, a white dot at the base of the wing, another near the base of the inner margin, and a series of four white spots seated on the wing-rays and parallel with the lower half of the hind margin; several zigzag transverse lines cross the wing, but are inconstant in colour and intensity: the hind wings are dark smoky-brown with a pale fringe: the antennæ are white at the base; the head and front of the thorax are pale gray; the disk of the thorax is darker, and the body smoke-colour.

The CATERPILLAR rests in a nearly straight position, but falls from its food-plant, rolled in a compact ring, when annoyed; the head is porrected, rather flattened, obscurely triangular, and not notched on the crown; it is narrower than the second segment, into which it can be partially withdrawn; the body is obese and velvety, rather narrowed towards the head, and rather swollen and dorsally elevated on the twelfth segment; the head is very glabrous, of a testaceous-red colour, and having two very dark, almost black lines down the face; the body is plum-coloured with a double series of large dark spots occupying a great portion of the dorsal area; each pair of these spots forms a kind of semicircle, the convexity of which is posterior, the straight portion anterior, and a pale and narrow medio-dorsal stripe divides each semicircle; there is a rather dark stripe on each side including the spiracles which are pale; the legs are testaceous-red like the head and the ventral area and claspers, and rather paler than the dorsal area: the general colour of the body may be described as plum-colour or violet-brown. It feeds on dock (*Rumex*) and other low-growing plants.

The MOTH appears on the wing in June and July, and has occurred in most of our English counties north and south, extending its range into Scotland. Mr. Birchall says it is widely distributed, and common in many places in Ireland. (The scientific name is *Aplecta herbida*.)



638. The Great Brocade (*Aplecta occulta*).

638. THE GREAT BROCADE.—The palpi are slightly incurved, and sometimes almost connivent at the tips; the second joint is very slender at the base; the fore wings are almost straight on the costal margin, and scalloped on the hind margin; their colour is very dark smoky-gray almost black, with two transverse pale gray zigzag lines, the first nearly straight and situated before the orbicular, the second much bent and beyond the reniform; the orbicular is oblique, it has a pale gray circumscription and darker median area; the reniform is less distinct, its circumscription is also pale gray, and its median area dark smoke-colour: the hind wings are smoky with a white fringe: the head, thorax, the body are very dark.

The CATERPILLAR rests in a straight position, but falls to the ground rolled in a compact ring if annoyed: the head is narrower than the second segment, and the face is rather flattened; the body is almost uniformly cylindrical, but there is a slight diminution in circumference towards the head: the anal claspers are rather long, stretched out behind, and spreading; the colour of both head and body is a rich bistre-brown, the head shining

and having a median pale line, and a pale patch on each cheek; the body is adorned with five pale stripes extending the entire length of the caterpillar; one of these is narrow and medio-dorsal; this is followed by a pale lateral stripe which in each segment emits a short oblique branch directed backwards; then follows on each side a white stripe in the immediate region of the spiracles; on the dorsal area of each segment are two distinct white spots on each side of the narrow medio-dorsal stripe; the ventral area, legs, and claspers are rather paler than the dorsal area. The CHRYSALIS is subterranean, of a dull dead black colour, with a very conical body and two sharp bristles like spines directed backwards from the thirteenth segment. It feeds on primrose (*Primula acaulis*) and other low-growing plants.

The MOTH appears on the wing in July, and has occasionally been taken in the Isle of Wight, Hampshire, Sussex, Surrey, Cheshire, Lancashire, Yorkshire, and in Scotland, but I cannot find that it has been met with in Ireland. (The scientific name is *Aplecta occulta*.)

Obs.—The northern specimens are remarkable for their dark colour, some of them being almost black.



639. The Gray Arches (*Aplecta nebulosa*).



639. The Gray Arches (*Aplecta nebulosa*).

639. THE GRAY ARCHES.—The palpi are porrected; the second joint is rather slender at the base and stouter at the tip, which gives it a clavate form; the antennæ are almost simple in both sexes; the costal margin of the fore wings is very slightly arched, the margin very slightly scalloped; their colour is either pale whitish-gray, or dark smoky-gray; in both cases they are marbled and mottled with darker shades; the discoidal spots are distinct; the orbicular is nearly circular, generally of a pale gray, with a central dark spot; the reniform has a dark circumscription, and a reniform figure outlined in its median area: the hind wings are smoky-gray and pale at the base; the thorax is crested and variegated with two shades of gray; the body is crested and smoky-gray.

The head of the CATERPILLAR is porrected and somewhat exserted, although rather narrower than the second segment; it is almost triangular in shape and very glabrous; the body is obese, and the segments are very strongly marked, each being somewhat swollen in the middle; it tapers gradually at the anterior extremity, and rapidly and suddenly at the posterior extremity; the surface is soft and velvety: the colour of both the head and body is wainscot-brown on the dorsal surface, shaded to pale, sickly, and semi-transparent olive-brown on the belly; there is a dark

brown mark on the head, single at the mouth, but divided towards the crown; the second segment has a shining plate and a somewhat kite-shaped mark, the apex pointing backwards; the third and fourth segments have each a narrow median dark mark, single and united in front, but forked and spreading behind, and each prong of the fork terminates in a circular black dot; the following segments (the fifth to the eleventh inclusive) have each a dorsal lozenge, the anterior half of which is pale, and contains two circular black dots, the posterior half is dark; a delicately slender pale medio-dorsal stripe passes through the entire series of these lozenges; on each side of the caterpillar is a darker shade just above the spiracles, but not amounting to a stripe; its ventral boundary is rather abruptly defined, but it is without a dorsal boundary; within this shade there is a single dot on the fifth segment, two spots on the sixth, and two oblique lines pointing backwards on the remainder. It probably feeds on low-growing plants in the autumn, but is rarely met with before hybernation, which frequently takes place in the stems of thistles: in early spring it ascends the stems of sallows (*Salix caprea*), white-thorn (*Cratægus oxyacantha*), birch (*Betula alba*), &c., and devours the young buds and opening leaves, and is full-fed in April and May, after hybernation; it then changes to a CHRYSALIS beneath the surface of the earth: the chrysalis is rich dark brown with a rather long cylindrical body, and has two strong straight bristles at the tip around which there are several short hooks.

The MOTH appears on the wing in June and July, and is very commonly found resting on park-palings and similar fences: it is abundant in the South of England, and is widely distributed in the North and in Scotland; and Mr. Birchall informs us it is also widely distributed in Ireland, and common in many places. (The scientific name is *Aplecta nebulosa*.)

Obs.—I am indebted to Mr. Bond for the loan of the extraordinary specimens represented in the right-hand column of the preceding page.



640. The Silvery Arches (*Aplecta tincta*).

640. THE SILVERY ARCHES.—The palpi are connivent or curved towards each other, the terminal joint being rendered inconspicuous by the scaliness of the second; the antennæ are nearly simple in both sexes: the fore wings are slightly arched beyond the middle of the costal margin; their colour is pearly-gray, very glossy, and somewhat silvery, which tint predominates in a broad band parallel with the hind margin, and bounded by a waved dark brown line; the upper median area of the wing is clouded with brown; the discoidal spots are present, but very inconspicuous, the orbicular is generally filled up with silvery gray: the hind wings are smoke-coloured, the rays being rather darker, and they have a waved white line parallel with the anal portion of the hind margin; the fringe is also white: the palpi and face are brown; the crown of the head and front of the thorax are very pale gray; the disk of the thorax is pale brown; the body is crested and smoky-brown.

The CATERPILLAR falls off its food-plant, feigns death, and rolls in a ring when touched or disturbed; its head is small in proportion to the body; its body soft and fleshy, the divisions of the segments being very distinctly marked by depressed rings: on the segments themselves are numerous depressions; and along the sides, in the region of the spiracles, are various conspicuous skin-folds. The colour of the head is shining testaceous-brown; of the body, pale raw sienna-brown, sprinkled with both white and black markings, so small as to be scarcely perceptible to the naked eye, and having also a very inconspicuous double medio-dorsal stripe composed of black dots, the intervening very narrow space being

nearly white; the spiracles are black; the legs and claspers of the same colour as the body. It feeds on birch (*Betula alba*), and those in confinement seemed to be nearly full-grown at the end of October, when they hybernate.

The MOTH appears on the wing in June and July, but cannot be called common; it has occurred at Plymouth, in the New Forest, Hampshire, in Sussex, Surrey, Kent, Essex, Berkshire, Gloucestershire, Worcestershire, Shropshire, and also in Scotland, so that its geographical range in Great Britain is extensive, but I do not find it recorded for Ireland. (The scientific name is *Aplecta tincta.*)



641. The Pale-shining Brown (*Aplecta advena*).

641. THE PALE-SHINING BROWN. — The palpi are very slightly porrected, and somewhat connivent at the tip; the antennæ are nearly simple, but those of the male are manifestly stouter than those of the female; the fore wings are scalloped on the hind margin; their colour is pale wainscot-brown, with the slightest possible tinge of red; the discoidal spots are very indistinct; the reniform has a white outer border, more particularly apparent at the lower extremity; parallel with the hind margin is a darker, but interrupted and uncertain line, which dilates into a kind of blotch near the anal angle: the hind wings, head, thorax, and body are dingy gray-brown.

The CATERPILLAR feeds by night, on lettuce, knotgrass (*Polygonum aviculare*), and many other plants, but buries itself during the day just below the surface of the earth; when annoyed it rolls itself in a ring, generally lying on its side, the legs and claspers being visible, it is full-fed at the beginning of September, and is then very obese; the head is generally porrected in crawling, glabrous, narrower than the second segment, into which it is partially withdrawn at the will of the insect; the second segment is narrower than the others, and has on its back a semicircular glabrous plate, the convex margin of which is directed backwards; the body is almost uniformly cylindrical; the thirteenth segment is very small; the anal claspers are very approximate and inconspicuous; the colour of the head is pale semi-transparent brown, that of the dorsal surface of the body very pale brown, tinged with smoky brown; there is a narrow medio-dorsal stripe of darker brown, tinged with olive-brown, and on each side of this is a broader testaceous stripe; the spiracles are bright sienna-brown, margined with black; the ventral surface, legs, and claspers very pale semi-transparent olive-brown; all the colours and every part of the body have smoke-coloured reticulations variously arranged: some of these assume the form of four dorsal dots on each segment, but all the colours and markings are confused and obscure.

The MOTH appears on the wing in June and July, and has occurred in most of our English counties and also in Scotland, but, I think, not in Ireland. (The scientific name is *Aplecta advena.*)



642. The Beautiful Brocade (*Hadena satura*).

642. THE BEAUTIFUL BROCADE.—The palpi are rather long and very decidedly porrected; the second joint is not very scaly, it is unusually slender towards the base, but stouter towards the tip, the terminal joint is small and short; the antennæ are rather stout in the male, but simple in both sexes: the fore wings are ample, the costal margin is rather arched towards the tip, the hind margin is scalloped rather slightly throughout the principal part of its length, but very deeply at the anal angle;

there is a slight prominence almost amounting to a tooth, on the inner margin rather before its middle, reminding one of the appendage so generally observable in the genus *Notodonta;* the colour of the fore wings is rich umber-brown, a good deal marbled and mottled with browns of other shades; the two discoidal spots are conspicuous, and have an unusually indented and irregular circumscription; their colour is testaceous-brown, but the reniform has a long dark cloud extending parallel with its interior border, and the orbicular has also a dark central cloud; a large blotch of testaceous-brown is situated within the anal angle of the wing; there is a series of pale dots on the hind margin, one at the point of each tooth of the scalloped margin, and a series of corresponding black dots, one in each hollow of the scalloped margin; within these, but still parallel with the hind margin, is a pale brown and interrupted zigzag line; below the discoidal spots, and parallel with the inner margin, is a large and diffused, but very dark blotch: the hind wings have an irregular outline; they are of a gray-brown colour, slightly glossed and iridescent, paler towards the base, and having a vague crescentic discoidal spot in the middle, and a series of very slender crescentic markings on the extreme margin: the head and thorax have the same colour as the fore wings, the body the same colour as the hind wings.

I believe Freyer is the only entomologist who has obtained the caterpillar of this species; the head is represented as of nearly the same width as the second segment, rather gibbous in the cheeks, and very slightly notched on the crown; the body is uniformly cylindrical, as far as and including the twelfth segment, the thirteenth very much narrower and smaller; the anal claspers are stretched out behind, and rather spreading, the colour of the head and dorsal area is pale testaceous-brown, each side of each segment having an oblique darker line, each pair of these lines forming the letter V, the point of which is directed backwards; an interrupted medio-dorsal series of black spots passes throu_h each of these V's, and the first and second of these dorsal spots is accompanied by a smaller white spot: the ventral area is pale ochreous-green, and the legs and claspers partake of the same colour; a very narrow but distinct white stripe separates the dorsal from the ventral area.

The MOTH appears on the wing in August, and two specimens are said to have been taken in England—one in Oxfordshire, the other in Cambridgeshire—and one in the county Wicklow, in Ireland, by Mr. Bristow. (The scientific name is *Hadena satura.*)



643. The Northern Arches (*Hadena assimilis*).

643. THE NORTHERN ARCHES.—The palpi are porrected, distant at the base, extremely sharp-pointed, and rather incurved or approximating towards the tips; the antennæ are perfectly simple in both sexes: the fore wings are ample and densely clothed with scales; their colour is the richest umber-brown, almost black, and glossed with purple; the discoidal spots are distinctly outlined in ochreous-white, but there is a solution of continuity, or almost so, on the inner side of each; at the base of the wing is a pale spot, and the disk of the wing is traversed by two transverse zigzag pale brown lines, one within the orbicular, the other without the reniform; the hind marginal area between this second transverse line and the hind margin itself is traversed by eight pale parallel wing-rays, and each joins a slender pale marginal line; a minute white spot appearing at each junction: the hind wings are smoky towards the hind margin, but paler at the base, and having a distinct crescentic discoidal spot; the fringe is rather paler than the disk of the wing, and there is a delicate pale line on the hind margin itself, similar to that on the fore wings: the head and thorax are exactly of

the same colour as the fore wings; the thorax is very stout and densely clothed with scales; the body has more the colour of the hind wings.

The MOTH appears on the wing in June. Mr. Doubleday has a pair of this insect taken at Rannock; Mr. Shepherd also has a specimen taken in Scotland by the late Mr. Weaver, and Mr. Stainton one taken by himself at rest, also in Scotland. (The scientific name is *Hadena assimilis*).

Obs. It seems desirable here to say a few words concerning *Crymodes exulis*, a species to which the present insect, *Hadena assimilis*, has been referred by Dr. Staudinger. In the first place I would remark that, supposing *Crymodes exulis* and *Hadena assimilis* to be identical, it is a remarkable instance of one genus assuming the character of another, for I can in no respect distinguish generically the two insects under consideration, and yet the caterpillar of *Exulis*, as described and figured by Millière, seems to have little or no resemblance to the caterpillar of an *Hadena*. Seeing that the name of *Crymodes exulis* (should it not rather be *Crymodis Exul*) has been introduced into our list, it seems desirable to give figures and a description of authentic continental specimens of that insect kindly lent me by Mr. Doubleday, and quote, from Millière's inestimable works, a description of the caterpillar.



The Exile (*Crymodes exulis*).

The palpi are inconspicuous, almost hidden beneath the very slightly projecting scales of the head; the fore wings are dark brown, tinged with ochreous or saffron, the discoidal spots being paler; the reniform is large and amorphous, the outer border being strongly toothed or divided into points; there is a darker band across the middle of the wing, including the orbicular, but only touching the reniform; this band is interrupted longitudinally by two paler wing-rays; the hind marginal area is also darker, and is interrupted by eight paler parallel rays; very near the tip of the wing is a rather conspicuous transversely-placed pale spot on the costa; the hind wings are saffron-brown towards the base, smoky-brown towards the hind margin; there is a slightly darker median transverse line, and a paler fringe tinged with saffron: the head, thorax, and body are very nearly the same colour as the fore wings.

The EGG is deposited by the provident parent on the stem of a grass, generally on some species of *Poa*, and the young CATERPILLAR emerges after a few days, and then at once introduces itself into the stem by gnawing a small hole just below the first *septum*; it feeds on the interior, making its way gradually downwards, head foremost, until it has arrived at the root. Winter, always so early in the north of Europe, is still more prompt in making its appearance in Iceland, the native country of this species, which is then in the caterpillar state: at its approaches these caterpillars hasten to shelter themselves from the severity of the cold, under that dense bed of moss or lichen with which almost the whole surface of the island is covered: in this vegetable bed they form long galleries, or mines, and in these they remain in a state of torpidity for many months. On the arrival of spring the caterpillar attains its full size, and if sought for at that season will readily be found, the long galleries which it has formed among the lichens revealing its presence to the entomologist. About the middle of June—that is to say, seven or eight months after burying itself in the lichen, it appears to be full-fed.

In its mysterious economy the caterpillar

of this species resembles those of the great genus *Agrotis*, which generally live concealed near the roots of low plants, or even among the roots themselves; it possesses, moreover, the maggot-like appearance and the obscure colouring of the greater number of these subterranean caterpillars: it is elongate, stout, cylindrical, and transversely wrinkled, and has a horny dorsal plate on the second and thirteenth segments, which are more wrinkled than the others, slightly tinged with yellow above, and exhibit certain indistinct indications of a medio-dorsal and lateral stripes; the head is of moderate size, spherical and notched on the crown; it is very shining and of a reddish colour, with brown mandibles and ocelli; the legs are of the same colour as the head, but black at the extremities; the claspers are of the same colour as the body, with the exception of the terminal disks, which are brown: the spiracles are oval and black, and are rendered very conspicuous by their contrast with the pale ground colour; the corneous plate of the second segment, occupying its entire dorsal surface, is of a reddish-yellow colour, but paler than the head; the corneous plate of the thirteenth segment is also brown, and corresponds in colour with that on the second; the trapezoidal warts are not larger than the other bristle-bearing warts, and in like manner emit short black hairs.

It spins itself a slight cocoon in the lichen, and in this changes to a CHRYSALIS, which is smooth, shining, rather elongate, and of a reddish-brown colour, and has absolutely no character by which it can be distinguished from the general run of *Noctua* chrysalids, unless it be that the last segment of the body, which is browner, is square at the extremity, and ends in four short points, of which the two in the middle are rather longer than those on the outside.

The MOTH appears on the wing in July, and has been brought in great numbers from Iceland. It flies during the day, and may sometimes be seen flying in crowds about the flowers scattered sparingly over the surface of the ground. The species has also been found in Labrador, Kamtschatka, Lapland, and the Arctic regions of North America. (The scientific name is *Crymodes exulis*.)

There can be no doubt that the natural situation of this species is between *Dasypolia Templi* and the genus *Xylophasia*.



644. The Dark Brocade (*Hadena adusta*).

644. THE DARK BROCADE.—The palpi are slightly porrected, the second joint clothed with long bristly scales, the terminal joint is comparatively slender, and square at the tip; the antennæ are slightly pectinated in the male, simple in the female: the fore wings are waved on the hind margin, but scarcely scalloped; their colour is rich dark umber-brown, the discoidal spots being perceptible, but indistinct; their central area is of the same colour as the general area of the wing; the circumscription of the orbicular is black and very slender; the reniform is narrow, its outer border zigzag and pale ochreous; parallel with the hind margin of the wing is a pale zigzag line, on the interior border of which rest a series of very dark wedge-shaped marks, the tips of which point towards the base of the wing; the entire area of the wing is mottled and marbled with darker and paler patches and lines, none of them very conspicuous: the hind wings are pale gray at the base, gradually shading to smoky-brown towards the hind margin, the discoidal spot and wing-rays being dark and very distinct; the fringe is pale, intersected throughout by a waved darker line: the head and thorax are dark umber-brown, the latter crested at the base; the body is slightly crested on the back and tufted along the sides; it is gray-brown with long paler scales at the base.

The EGG is laid in June on the leaves of many garden plants, and the CATERPILLAR emerges in August; at first it is a dingy green colour and without markings: it attains

its full growth before the end of September, and then rests in nearly a straight position on the twigs of the sallow, but when annoyed it falls to the ground rolled in a compact ring and feigns death; in this posture it remains but a few seconds, and then re-ascends the stems of the sallow with great activity. At this period it nearly abandons the leaves of the sallow as food, and feeds almost exclusively on those swollen flower-buds which contain the male catkins of the ensuing year: the head is semi-porrect, subglobose, highly glabrous, and scarcely narrower than the second segment: the body is almost imperceptibly attenuated at the anterior extremity, otherwise uniformly cylindrical; the dorsal surface transversely wrinkled; the colour of the head is dingy green, reticulated with brown; the dorsal surface of the body is pale purple-brown, inclining to pink on the second, third, and fourth segments, and obscurely reticulated throughout with smoky-brown; the spiracles are very pale wainscot-brown, almost white, and are surrounded with jet-black rings; the ventral surface is pale olive-green, sprinkled with dingy white, many of the white markings emitting pale hairs; the claspers are concolorous with the ventral surface; the legs are pale transparent green, tipped with pink. During October these caterpillars may be found at night feeding on low-growing plants, but in the daytime they invariably secrete themselves in the ground or under leaves: when full-fed they enter the ground, each forming a hybernaculum, in which it remains until April, and then assumes the CHRYSALIS state.

Mr. Buckler has described two varieties of the caterpillar as under:—

Var. 1.—The ground colour is a brilliant yellow, the upper surface suffused with deep rose pink; the dorsal stripe composed of two darker pink lines, confluent at the beginning of each segment, forming a spot; the sub-dorsal stripe bright yellow, only visible on the anterior halves of the segments; the tubercular spots and two transverse streaks near the end of each segment also of the bright yellow ground colour.

Var. 2.—A dull pale yellowish-green, the dorsal stripe faintly outlined with orange-red, with a spot at the segmental divisions; sub-dorsal line of the same colour, but interrupted on the hinder half of each segment; tubercular dots red, and situated on the faint reddish outlines of diamonds, which are very delicately freckled within; spiracles white ringed with black.

The MOTH appears on the wing towards the end of May, and has been taken in most of our English and Scotch counties, and Mr. Birchall informs us that in Ireland it is common and widely distributed. (The scientific name is *Hadena adusta.*)



645. The Brindled Green (*Hadena Proteus*).

645. THE BRINDLED GREEN.—The palpi are slightly porrected, the second joint clothed with bristly scales, the terminal joint also rather scaly; the antennæ are nearly simple in both sexes; the fore wings are waved on their hind margin, their colour is a variegated mixture of black, white, and green, the boundary of each colour being sharply defined; the orbicular is almost wholly white, the median area having a few scattered black and green scales; the reniform is oblique and indistinct; below the discoidal spots, and often united with the orbicular, is a pale

blotch of about the same size, but this is inconstant in form, size, and colour; it sometimes forms an obscure triangle in conjunction with the two discoidal spots; parallel with the hind margin is a bent transverse series of white dots; the hind wings are smoky-brown, rather paler at the base; the hind margin is waved, the fringe is paler than the general area, and is intersected throughout by a slender darker line; the head and thorax are richly mottled like the fore wings, the body smoky-brown.

The CATERPILLAR rests in a nearly straight position, but falls from its food-plant rolled in a compact ring when annoyed: the head is of nearly the same width as the second segment, the body is almost uniformly cylindrical, soft and velvety: the head is gray, tinged with testaceous-brown, and having a very slender darker median line, and a rather broader dark stripe down each cheek; the body is pale gray or putty-coloured, with a treble medio-dorsal stripe, the interior division being almost white, the exterior divisions nearly black, and each projecting a decided lateral lobe into the middle of each segment; on each side there is a less distinct stripe of a smoky-brown colour; this stripe emits a rather slender branch, directed obliquely backwards and upwards; the ventral surface is nearly of the same colour as the dorsal area, but has a tendency to green between the claspers and between the legs.

The MOTH appears on the wing in September, and seems to be very generally distributed in England and Scotland, and Mr. Birchall says it is common in the county Wicklow in Ireland. (The scientific name is *Hadena Proteus.*)

Obs. 1.—The beautiful varieties represented in the second and third figures are kindly lent me by Mr. Bond and Mr. Wenman, purposely to illustrate this work.

Obs. 2.—It will be observed that I have restored the proper name "Proteus" to this species, it having been previously changed to "Protea" in order to make it agree with the genus *Hadena.* Entomologists have rather peculiar views about the construction of Latin, but I do not consider myself under any obligation to depart from the ordinary rules of the language as we find it in the classics.



646. The Glaucous Shears (*Hadena glauca*).

646. THE GLAUCOUS SHEARS.—The palpi are porrected and rather distant, the scales rough and hair-like; the antennæ are simple: the colour of the fore wings is smoky-black, much variegated with gray, and having the discoidal spots of a chalky whiteness, with a slight median shade; the reniform is very conspicuous, the orbicular less so, and there is an oblong pale spot below the orbicular, also less distinct; the other markings are sharply defined, but of the same colours—smoky-black and gray; the fringe is spotted; the hind wings are gray-brown, with a small black discoidal spot and a whitish fringe: the head and thorax are variegated like the fore wings, the body plain gray-brown, like the hind wings; it is crested, the tips of the crests being darker.

The CATERPILLAR, when full-fed, rests in a nearly straight position, but falls off its food-plant and rolls in a compact ring when disturbed; the head is narrower than the second segment, and very shining; its colour is pale testaceous-brown, reticulated with darker brown; the body is smooth and cylindrical; its colour is umber-brown, and reticulated, like the head, with a darker tint; there is a narrow and somewhat interrupted medio-dorsal stripe, and a double series of oblique markings on each side of this stripe; each mark has a portion darker and a portion lighter than the general ground colour; there is a rather broad and very distinctly defined side-stripe of a dingy white colour, extending from the head to the extremity of the anal claspers; the spiracles are white; the belly is dingy brown and the claspers concolorous. It feeds on

the sallow (*Salix caprea*), and will eat lettuce freely in confinement. At the beginning of August my specimens, for which I am indebted to Mr. W. Johnson, of Liverpool, changed to CHRYSALIDS on the surface of the earth: these were dark brown and shining, and had two very distinct incurved spines seated on the broad wrinkled tip of the body; each segment of the body had also a ring of short spines, like those of the goat-moth chrysalis.

The MOTH appears on the wing in June, and seems to be a northern species; it is, however, said to have occurred in Worcestershire, Shropshire, Lancashire, Cheshire, the Lake District, and Yorkshire; it is reported to be common also in Scotland. (The scientific name is *Hadena Glauca.*)



647. The Shears (*Hadena dentina*).

647. THE SHEARS.—The palpi are very inconspicuous, scarcely porrected, and almost connivent; the antennæ are simple: the fore wings are gray with the slightest possible tinge of wainscot-brown; they have a darker median band, broad on the costa, and narrow on the inner margin: this band contains both the discoidal spots; these are clearly defined, pale gray with a darker median cloud; the wing-rays passing through this band are also pale gray: the hind margin is chiefly occupied by a darker band-like shade, which is intersected throughout by a pale zigzag line: the hind wings are gray-brown with slightly darker rays, and a pale fringe: the head, thorax, and body are dark gray, variegated with paler gray; the body is crested, the tips of the crests being darker.

The head of the CATERPILLAR is narrower than the second segment, into which it is partially received; the body is almost uniformly cylindrical and smooth, but emitting a few scattered hairs from each segment; it is of a dull opaque ground-colour, and has a medio-dorsal series of lozenge-shaped markings placed end to end, and forming a continuous chain; this chain has a white border on each side following the outline of the lozenge; each side of the caterpillar has three parallel stripes in the region of the spiracles, the middle one darker than the others; the legs and claspers are concolorous with the body. It feeds on the roots of dandelion, and when full-fed changes to an opaque dark brown CHRYSALIS, emitting singular spines from the body, the posterior of which, those on the twelfth segment, are the largest and most conspicuous.

The MOTH appears on the wing in June and July, and is of general occurrence throughout England and Scotland. Mr. Birchall says it is widely distributed, and often very common in Ireland. (The scientific name is *Haaena dentina.*)



648. The Stranger (*Hadena peregrina*).

648. THE STRANGER.—The palpi are porrected and connivent, the terminal joint conical and nearly naked; the antennæ are simple, the fore wings are nearly straight on the costa, blunt at the tip and slightly scalloped on the hind margin; their colour is gray, tinged with pale wainscot-brown, and having certain indistinct and confused markings, both paler and darker than the ground colour; the orbicular spot is large, oblong, oblique and pale; the reniform very indistinct, but having a darker central area; parallel with the hind margin is a pale zigzag line, which projects two sharp teeth to the extreme margin, rather below its middle: the hind wings are very pale, almost white, with darker wing-rays, but the darker portion of the wing-rays neither reaches the base nor the margin, which is slightly scalloped and accompanied by a slender brown line; the head and thorax are

of the same colour as the fore wings, the body of the same colour as the hind wings.

The CATERPILLAR is figured and described with evident care in Boisduval's "Collection des Chenilles:" the head is greenish: the body is sometimes of a reddish-brown colour, sometimes of a violet-brown; it has, on the back of every segment, four small black dots, arranged in pairs between two darker stripes, and is also covered with crowded white dots below the spiracles; the spiracles are white and are rendered conspicuous by being placed each in the middle of a long narrow black spot, and these black spots form a very regular series, below which there is an orange-red stripe, bordered both above and below with a very narrow stripe of pure white; and again, below this compound stripe of white and red there are on each segment two black dots placed obliquely; the vertical surface is generally of a pale yellow or green; the legs and claspers are concolorous with the ventral surface. It feeds on the prickly saltwort (*Salsola Kali*) and various species of goosefoot (*Chenopodium*) from the middle of May to the beginning of July, when it is full-fed and spins on the surface of the ground a very flimsy and imperfect cocoon, in which it changes to a CHRYSALIS in about a week.

The MOTH appears on the wing continuously from the last week in July to the beginning of September, and is common on the shores of the Mediterranean; but as regards Britain, two specimens only have been taken, both in the Isle of Wight; one of them is in the possession of Mr. Bond, who has most kindly brought it to me for figuring and description in this work. (The scientific name is *Hadena peregrina*.)



649. The Nutmeg (*Hadena Chenopodii*).

649. THE NUTMEG.—The palpi are porrected, the second joint slender and not very scaly; the antennæ are simple; the hind margin of the fore wings is very slightly waved; their colour is gray-brown, obscurely mottled and lined with darker and paler brown; both discoidal spots are traceable, but inconspicuous; their circumscription is black and very slender, and within this is a second paler circumscription; three paler transverse lines cross the wing: the first is short, near the base, and waved, and both sides are delicately bordered with black; the second is before the orbicular, also waved, and bordered on both sides with black; the third is beyond the reniform, zigzag, and bordered on the inside only with black: parallel with the hind margin is a bent and zigzag pale line; the hind wings are gray-brown, a crescentic discoidal spot and the wing-rays being darker; the fringe is pale; the head, thorax, and body are gray-brown.

The EGGS are laid about Midsummer, on the stalks and leaves of several species of goosefoot (*Chenopodium*), on which the caterpillars appear almost exclusively to feed; they are full-fed about the end of August, and then fall of their food-plant and roll into a compact ring if annoyed. The head is narrower than the body, and porrected in crawling; the body is obese, uniformly cylindrical, very smooth and velvety, the anterior extremity sometimes extended in a leech-like manner. The head is glabrous, opaque green, and reticulated on the sides of the cheeks with paler markings; the body is olive-green, delicately reticulated with black, and having two parti-coloured stripes on each side, the upper imperfectly defined, white or pinky white, or more rarely yellow; it extends from the head completely round the anal flap, and is bordered above with a series of amorphous patches of intense velvety black; the lower stripe is narrow, but very distinct and clearly defined; it passes, just below the spiracles, from the head to the anal claspers; its colour is pink, narrowly bordered above and below with pure white; the spiracles are also pure white, delicately bordered with black; the belly, legs, and claspers are pure olive-green. Such is a description of the more usual or normal

colouring of this pretty caterpillar, but neither of the colours seems absolutely constant, and the dorsal surface varies from the usual opaque green to bright apple-green, to pink, to clear brown, and to deep olive-brown; it is full-fed at the end of August, and changes to a smooth brown CHRYSALIS below the surface of the ground.

The MOTH appears on the wing about Midsummer, stragglers being met with throughout July. The caterpillar is much more abundant than the moth, since it absolutely swarms on the various species of *Chenopodium* which invariably spring up in waste places round London. It also occurs in all the southern counties of England, but does not extend far north, Shropshire being its utmost limit so far as hitherto ascertained. The name appears in Mr. Green's list of Irish Lepidoptera. (The scientific name is *Hadena Chenopodii.*)



650. The Orache Moth (*Hadena Atriplicis*).

650. THE ORACHE MOTH.—The palpi are porrected, the second joint stout and scaly, the third slender, very distinctly exserted, and almost naked: the antennæ are simple in both sexes: the fore wings are very straight on the costal, slightly waved on the hind margin, and almost rounded at the tip; their ground-colour is gray-brown; the discoidal spots are green, the orbicular having a pale, almost white, circumscription, the reniform having the inner border white, and a waved white line as well as a gray-brown shade on the median area; there are several other green blotches, one at the base of the wing, another between the base and the orbicular, but lower than either; a third, the largest, near the anal angle, and several others: there is also a very conspicuous white blotch almost in the middle of the wing, it originates at the lower outer extremity of the orbicular, and passing obliquely below the reniform, points towards the anal angle; parallel with the hind margin is a much bent, very clearly-defined whitish line, which terminates at the anal angle: the hind wings are smoky-brown, with the base and fringe pale, and the discoidal spot darker: the head and thorax are variegated like the fore wings, the body plain gray-brown like the hind wings.

The head of the CATERPILLAR is porrected in crawling, but semi-prone when at rest; it is scarcely narrower than the second segment; the face is flat, and the crown without a notch; the body is obese and rather velvety, cylindrical, and having the dorsal surface of the twelfth segment gibbous; it falls from its food-plant rolled in a very compact ring when disturbed: the colour of the head is pale testaceous-brown, approaching to red, and having a slightly darker mark down each cheek; the dorsal surface of the body is green, but the tint is very various, sometimes approaching to olive, at others to yellow-green, and sometimes it is even dark olive-green: there is a very dark but narrow medio-dorsal stripe, and a sub-dorsal stripe of the same width and colour, but less clearly defined; each of these three stripes contains a series of pale dots, and on the back of each segment are the usual four black dots, of which the anterior pair are nearest together: below the dark sub-dorsal stripe is a bright stripe, sometimes inclining to yellow, but generally to pink, and both the borders of this bright stripe, which extends from the head to the very extremity of the anal claspers, are almost white, which makes the stripe itself peculiarly conspicuous: this stripe contains the spiracles, which are white; on each side of the dorsal area of each segment is an oblique dark streak; the ventral is rather paler than the dorsal area; the legs and claspers are pink, but rather dingy: it feeds on various species of orache (*Atriplex*), goose foot (*Chenopodium*), persicaria (*Polygonum*), dock (*Rumex*), and many other low plants, but only in the night, concealing itself by day under stones or clods of earth, often at a very considerable distance from its food-plant; when full-fed it changes to a CHRYSALIS beneath

the surface of the ground, enclosed in a very singular cocoon, half silk and half earth; these the dealers collect in great numbers and sell at a very moderate price, and from them are procured those fine series of moths which appear in most of our collections: the CHRYSALIS is of a reddish-brown colour, and shining; the body is conical, and terminates in a very sharp point.

The MOTH appears on the wing in June, and has occurred at Hampstead in Middlesex, Buckinghamshire, Essex, Norfolk, Suffolk, and Cambridgeshire. (The scientific name is *Hadena Atriplicis.*)



651. The Dog's-tooth (*Hadena suasa*).

651. THE DOG'S-TOOTH. — The palpi are manifestly porrected, the terminal joint concealed among the scales of the second; the antennæ in both sexes are simple: the colour of the fore wings is pale dingy-brown, the discoidal spots having a median area of the same colour; the orbicular has generally a complete but very narrow black circumscription; it is oblong and oblique; the reniform has a less perfect circumscription, and the lower portion of its median area is darker than the upper portion, there is a dark line at the middle of the base of the wing pointing towards the middle of the wing; parallel with the hind margin is a very distinct but narrow zigzag yellow line, which projects a W-shaped mark to the hind margin, and on which rest several dark wedge-shaped marks, the points of which are directed towards the base of the wing; the hind margin is usually darker than any other part of the wing: the hind wings are gray-brown; the head and thorax are of the same colour as the fore wings; the body is crested and of the same colour as the hind wings.

In confinement the CATERPILLAR feeds vigorously on the common knotgrass (*Polygonum aviculare*), and is full-fed about the third week in July. It eats principally by night, resting by day in a straight position on those stems of its food-plant which are prostrate on the ground; but, when disturbed, it elevates the anterior part of its body, tucks its head in tightly, and assumes an elegant and most Sphinx-like attitude, even more striking than that of *Sphinx Ligustri.* If the food-plant be shaken, it falls to the ground in a tight compact ring: the head is narrower than the second segment, into which it is partially received when at rest: the body is almost uniformly cylindrical, but slightly attenuated at both extremities, the divisions of the segments being decidedly but not deeply marked; the surface is smooth and velvety, but exhibiting under a lens a few minute short hairs: the colour is various; that of the head and body of the same hue; the prevailing varieties are obscure grass-green and olive-brown, as in so many other of our *Noctuas*, the head sometimes plain, sometimes reticulated with darker markings, the dorsal being always darker than the ventral area of the body, and divided immediately below the spiracles by a bright and very conspicuous stripe which extends from the head into the anal claspers; this stripe is bright ochreous-yellow, narrowly margined above by dark umber-brown in the browner specimens, by black in the greener ones, and margined below by a paler stripe, which in some specimens has a tinge of brick-red; the dorsal surface has three indistinct narrow stripes darker than the ground-colour and dividing the dorsal area into four equal parts: these three stripes are scarcely perceptible in the greener specimens, but in some of the browner specimens are very conspicuous, and interrupted at the divisions of the segments; and each of the exterior ones is thus divided into a series of separate markings, each of which is slightly oblique, and together they constitute a tolerably regular series on each side of the back: on each side of each segment, equidistant between the medio-dorsal and the interrupted stripe, is a double dot, half black and half white; and the entire

surface is reticulated with smoky-black, and dotted with white; the ventral is not only paler than the dorsal area, but is slightly transparent, and, like the dorsal area, is reticulated with darker and dotted with lighter markings.

The MOTH appears on the wing in June, and has occurred in nearly all our English counties as far north as Yorkshire, and also in the county Wicklow, in Ireland, but is not common in any part of that island. (The scientific name is *Hadena suasa*.)



652. The Bright-line Brown-eye (*Hadena oleracea*).

652. THE BRIGHT-LINE BROWN-EYE.—The palpi are porrected and slightly incurved at their tips; the antennæ are simple: the colour of the fore wings is reddish-brown, the reniform, when perceptible, which is not always the case, has a white circumscription, the median area being of the general ground-colour; the reniform has an interrupted circumscription, composed of white scales, but these are occasionally wanting; it has also a dull ochreous blotch towards its costal extremity: parallel with the hind margin is a bright snow-white line, which near its middle projects a white W to the hind margin; the hind wings are pale gray-brown at the base and darker towards the hind margin, and have the fringe again paler: the head and thorax are of the same colour as the fore wings, the latter is conspicuously crested; the body is gray-brown, with long, pale, hair-like scales at the base.

The CATERPILLAR rolls in a ring when disturbed: its usual colour is pale delicate green, less commonly clear transparent brown, always having a narrow bright yellow stripe immediately below the spiracles; above the yellow stripe is a less distinct smoke-coloured stripe, which gradually vanishes into the green of the back; on the back of every segment are several jet-black dots; on the second, third, and fourth segments these dots form a direct transverse series, but not on the following segments; on each side of the caterpillar, below the spiracles, are three or four more of these black dots, and on the sixth, seventh, eleventh, and twelfth segments there are black dots on the belly; in addition to the more conspicuous black dots, the back is sprinkled with multitudes of ocellated and very minute white dots: it feeds on a variety of plants—the common nettle (*Urtica dioica*), elm (*Ulmus campestris*), several species of dock (*Rumex*), &c. &c., and is full-fed in September, when it buries itself in the earth to assume the CHRYSALIS state.

The MOTH appears on the wing in June, and is very generally distributed in England, Scotland, and Ireland. (The scientific name is *Hadena oleracea*.)



653. The Broom Moth (*Hadena Pisi*).

653. THE BROOM MOTH.—The palpi are porrected, the second joint very scaly, the scales projecting beyond the tips of the third; the antennæ are simple: the colour of the fore wings is reddish-brown, sometimes slightly variegated, at others quite plain; the discoidal spots are inconspicuous; parallel with the hind margin is an interrupted waved transverse yellow line, which expands into a blotch near the anal angle; in the variegated and darker specimens this line is white: the hind wings are reddish gray-brown, rather paler at the base: the thorax is crested and of the same colour as the fore wings, the body of the same colour as the hind wings.

The CATERPILLAR rolls in a ring when disturbed. It is very beautiful; the head is

shining, very pale green; the body has a broad medio-dorsal stripe olive-green and most delicately irrorated and margined with black; on each side of this is a narrower stripe of bright clear yellow; and again, below the yellow stripe is a broader stripe of olive-green, which, like the medio-dorsal stripe, is delicately irrorated and margined with black; then follows on each side a narrow stripe, the upper half of which is white, the lower half yellow; this stripe includes the spiracles; the belly is pale green sprinkled with black along the spiracular line; the legs and claspers are pale green. After the last change of skin, the green parts frequently become rich purple-brown. It is said to feed on broom and other shrubs, but I have invariably found it on the common brake (*Pteris aquilina*).

The MOTH appears on the wing in June, and seems to be very generally distributed in England, Scotland, and Ireland. (The scientific name is *Hadena Pisi*.)



654. The Pale-shouldered Brocade (*Hadena thalassina*).

654. THE PALE-SHOULDERED BROCADE.—The palpi are scarcely porrected and inconspicuous, the second joint being very scaly; the antennæ are simple in both sexes: the colour of the fore wings is reddish-brown, brightly variegated with darker shades; both the discoidal spots are clearly defined by a slender black circumscription; the orbicular has also a white circle within this black one: there is a pale blotch at the base of the costal margin, which gives its name to the species, and there are three transverse pale lines, the first before the orbicular and nearly direct; the second beyond the orbicular and much bent; and the third parallel with the hind margin, and near its middle projecting a W-mark towards the hind margin; resting on this third pale line are two or more acutely-pointed dark wedge-shaped marks which point towards the base of the wing; in connection with the second of these transverse lines, and between it and the third, is a transverse series of six white dots, all of them seated on the wing-rays, and each preceded, as well as followed, by a black dot: the hind wings are reddish gray-brown, the wing-rays being slightly darker and the fringe slightly paler: the thorax is crested, and, like the fore wings, much variegated; the body is also crested and gray-brown, and much redder in the male at the extremity.

The CATERPILLAR feeds freely in confinement on the common knotgrass (*Polygonum aviculare*) by night, almost invariably retiring just below the surface of the earth by day. I once observed a specimen at rest, stretched at full length on one of the stems of knotgrass during the day, with its back downwards and its anal claspers stretched out behind, but still grasping the food-plant; on being touched it instantly rolled in a compact ring. The head is rather narrower than the second segment, porrected, and highly glabrous; the body is velvety and almost uniformly cylindrical, but slightly attenuated anteriorly; the twelfth segment is slightly gibbose dorsally: the colour of the head is pale dingy-brown, delicately reticulated with darker brown; the body is dull brown, tinged with pink, every part beautifully and delicately reticulated with dark umber-brown, which colour forms a pair of oblique sub-dorsal markings; these pairs are indistinct towards the head, but increase in intensity to the twelfth segment,

on the back of which they are united; on each side immediately below the spiracles, which are almost white, is a well-defined light stripe, conspicuously tinged with pink; the upper margin of this lateral stripe is delicately bordered with white, the stripe itself is reticulated, but not so conspicuously as the dorsal surface; the ventral surface, legs, and claspers are slightly paler and more semi-transparent than the back, dotted and reticulated. It changes to a CHRYSALIS just beneath the surface of the earth, at the end of July.

Such is the general character and appearance of the caterpillar; but as Mr. Buckler has described some varieties which were sent him by my friend Mr. Doubleday, I can do no less than copy his descriptions.

Var. 1.—Reddish-brown above as far as the spiracles, a dull brown plate on the second segment, through which the dorsal and sub-dorsal lines are traced; the dorsal line pale ochreous on the anterior segments, but on the others much suffused with the ground colour, except at the segmental divisions, where it reappears as an ochreous spot. The sub-dorsal line is ochreous, and much suffused with brown. On the fifth segment to the twelfth, inclusive, a dorsal diamond-shape of mottled brown, darker than the ground-colour, and on each side a wedge-shape of very dark brown pointing forwards, their broad ends a little distance from the segmental divisions, their sides edging the lower half of the diamonds and the sub-dorsal lines. The wedge-marks gradually increase in size towards the twelfth segment, where they are largest and darkest, and most conspicuous, by the sub-dorsal line being there suddenly paler and united by a transverse pale line at the base of the wedges. Spiracular line black, on which are the white spiracles, and running immediately beneath is a pale grayish stripe, its upper edge whitish, belly and legs brownish-gray, head pale brown.

Var. 2.—A rich cinnamon-brown mottled with ochreous above; belly and legs paler, and greenish-ochreous; dorsal and sub-dorsal lines paler than the ground-colour, but not very distinct, the diamond-marks hardly visible; the blackish wedge-marks strongly defined, but with the addition of two or three fine streaks of ground-colour cutting transversely through them all; the tubercular dots black in the following order: a transverse row of eight dots on the third and fourth segments, and on the fifth to the twelfth, inclusive; the anterior dorsal pair distinct, the posterior pair hardly visible by being placed in the broad ends of the wedges, and a lateral anterior dot midway between the sub-dorsal and black spiracular lines; a dull brown plate on the second segment; head brownish-ochreous, with a blackish stripe on each lobe from the crown to the mouth.

Var. 3.—A dull grayish-brown; the dorsal and sub-dorsal lines, and penultimate transverse mark, very little paler than the ground; the tubercular dots black, the wedge-marks black, with a thin transverse line of ground-colour cutting them through towards the broad end.

The MOTH appears at the end of May and beginning of June, and seems to occur very generally in England, Scotland, and Ireland. (The scientific name is *Hadena thalassina.*)



655. The Beautiful Brocade (*Hadena contigua*).

655. THE BEAUTIFUL BROCADE.—The palpi are inconspicuous, the antennæ simple in both sexes; the fore wings are beautifully mottled and marbled with delicate shades of brown and gray, and in the region of the reniform there is not uncommonly a saffron tint; the orbicular is roundish, and its median area white; the reniform has a slender black circumscription, its median area is gray; adjoining the orbicular and passing obliquely below the reniform is a lozenge-shaped pale gray spot; at the costal base of the wing there is

also a rather large gray spot; a transverse waved line, not very distinct, crosses the wing before the orbicular, and another beyond the reniform; these two lines are connected below the lozenge-shaped spot already noticed by a longitudinal black line, somewhat resembling the letter I; at the middle of the base of the wing is a second black line not so conspicuous as the first; beyond the discoidal spots is a gray band, very pale at its lowest extremity, and between this and the hind margin is a zigzag white line, resting on which are several dark wedge-shaped marks, having their points directed towards the base of the wing; the hind wings are pale gray, slightly suffused with saffron: the head and thorax have the same colour as the fore wings; the body is gray-brown, and crested, the tips of the crests being dark brown.

The CATERPILLAR rolls in a ring when touched, but soon unrolls itself and commences crawling with great rapidity: the head is shining, and of a dingy green colour reticulated with rufous-brown; the body is orange-ochre coloured, inclining to rufous on the back, and to dingy yellowish-green on the sides and belly; the rufous tint of the back is due to reticulated markings, which are crowded and clustered in certain parts, so as to form a series of eleven V's down the middle, the apex of each V pointing towards the anal extremity; a narrow and interrupted rufous stripe on each side includes the spiracles. It feeds on the common birch (*Betula alba*) and oak (*Quercus Robur*), and is full-fed at the end of September.

The MOTH appears on the wing in June, and although by no means an abundant species, seems to be widely, and I think I may say generally, distributed in England, Scotland, and Ireland. (The scientific name is *Hadena contigua.*)

Obs.— The English names of the *Hadenas* are adapted for the sake of uniformity: I cannot say that I regard them as either very descriptive or appropriate: the present species for instance is not distinguished from the rest by its greater beauty.



656. The Light Brocade (*Hadena Genistæ*).

656. THE LIGHT BROCADE.—The palpi are inconspicuous, the terminal joint small and pointed; the antennæ are simple: the fore wings are beautifully mottled and marbled with various tints of gray and brown; the orbicular is round and has a slender black circumscription; the reniform has not so perfect a circumscription; the median area is gray in both; immediately below them is a longitudinal blotch of rich dark brown; at the costal base of the wing is a rather large gray spot, and below this a very distinct linear longitudinal black mark; beyond the discoidal spots is a broad pale gray band extending entirely across the wing, and beyond this a pale gray zigzag line accompanied by dark margins and a few dark wedge-shaped marks which point towards the base of the wing; the hind wings are gray-brown with darker wing-rays and paler fringe: the head is gray: the thorax is gray and crested; it has a very distinct transverse black line on the collar; the body is gray-brown and crested.

Mr. Buckler has described the CATERPILLAR from specimens sent him by my friend Mr. Doubleday. He says: "When young the colours of these caterpillars were brighter and darker than they afterwards became, with distinct paler dorsal and sub-dorsal lines outlined with darker and black spiracular lines. When full-grown they were very plump creatures, varying from an inch and five-eighths to an inch and three-quarters in length, cylindrical and tapering towards the head; the back and sides, as far as the row of spiracles, of very mottled dull brown, brownish-gray, dull greenish-gray, deep purplish-brown, or dirty olive-greenish—for all these tints were found in the brood. The dorsal and sub-dorsal stripes are outlined with darker brown, in many instances only visible on the anterior

segments, and in others also at the segmental divisions. A series of darker brown diamond and wedge-shaped marks down the middle of the back, on the fifth to the twelfth segment, inclusive; namely, on each side of these segments a diamond united to a wedge-shape on either side, the broad ends of the wedges extending to the end of the twelfth segment only, and to about one-third from the ends of the other segments, each wedge pointing forwards reaching a third into the segment in advance. The tubercular dots blackish, the upper pair placed on the edges of the diamonds, the lower pair on the broad ends of the wedges; in the purplish-brown variety the dots and lines are paler than the ground-colour, and in some instances not visible. The whitish spiracles edged with blackish are placed along the terminal line of the above brown colouring, and the remaining surface below, including the legs, is of a dirty whitish or pale drab-colour, the legs tipped with brown. Head with two central black streaks across the face; a dark brown plate on the second segment, sometimes marked with one pair, and in others two pairs, of pale spots." It feeds freely in confinement on chickweed (*Alsine media*), and persicaria (*Polygonum*), and is full-fed by the second week in August, when it retires just beneath the surface of the earth to undergo pupation.

The MOTH appears on the wing at the end of May, and occurs not unfrequently in our southern counties, and as far north as Worcester, but I think not in Scotland: Mr. Birchall says that it occurs in the county Wicklow, but is not common in Ireland. (The scientific name is *Hadena Genistæ*.)



357. The Saxon (*Hadena rectilinea*).

THE SAXON.—The palpi are slightly porrected, and have a small naked white terminal joint; the antennæ are simple; the colour of the fore wings is a mixture of pale gray almost white, and rich sepia-brown; the lighter colour occupies the base of the wing, more particularly the costal half of the base, and also the hind-marginal area; the median area of the wing is occupied by the sepia-brown, and includes the discoidal spots: the orbicular is small, obscure, and flattened longitudinally, sometimes reduced to a mere line; it varies also in colour, sometimes being pale gray, at others concolorous with the brown area by which it is surrounded; in some instances it is a dark line united to the reniform, of which it appears a mere appendage; the reniform is more distinct but narrow, its usual colour is gray with a slender median shade of brown; the hind-marginal area contains cloudy brown marks and darker wedge-shaped marks, the points of which are directed towards the base of the wing; the outer lower angle of the gray blotch which occupies the costal portion of the base of the wing is often prolonged into a kind of hook, the point of which is directed towards the base of the wing; it must, however, be admitted that the markings of the wings are far too inconstant to afford any reliable characters: the hind wings are gray-brown; the head is gray; the thorax is gray, with the sides and a transverse line in front rich brown; the body is gray-brown and crested.

The EGG is laid in June, on the leaves of sallow (*Salix caprea*), and the young CATERPILLAR emerges in July; it feeds with great voracity, and grows very rapidly, attaining its full size before it retires for the winter, which is usually about the end of October, but sometimes earlier; in a state of nature these caterpillars probably hybernate on the surface of the ground, under the fallen leaves of the sallow; but in confinement they have a diversity of practice, sometimes concealing themselves in the *débris* covering the earth in the breeding-cage, sometimes ascending the sides of the cage, and adhering to the sides or top: they also differ in another respect, sometimes covering themselves with a slight web, at other times being perfectly exposed:

towards the end of March they appear to become more lively, and crawl about the cage; they are, however, much reduced in size by the winter's abstinence; if supplied with twigs of sallow, they do not appear to eat the opening leaves, but prepare for pupation. The caterpillar now rests with its head frequently turned on one side until it touches the ninth segment; if annoyed, it falls to the ground rolled in a compact ring, feigning death, and remains in that posture several minutes: the head is semi-porrect, sub-globose, highly glabrous, slightly narrower than the second segment: the body is nearly uniformly cylindrical, but slightly attenuated towards the anterior extremity; the twelfth segment is transversely dorsally elevated, but not very conspicuously so; the surface is velvety and iridescent, the iridescence resulting from the light falling on the delicate soft short pile with which it is covered; the anal claspers are spreading: the colour of the head is dark brown, and, like the body, iridescent: the dorsal surface of the body is dark rich umber-brown, clouded and variegated with lighter and darker shades; a darker shade forms an obscurely-defined medio-dorsal stripe, which emits at the posterior margin of each segment a branch, extending obliquely downwards and forwards, until it reaches a broad dark lateral stripe that terminates abruptly on a level with the spiracles, which are wainscot-brown: ventral surface extending upwards towards the spiracles, purple-brown, with a bloom like that of a ripe plum, and delicately reticulated; twelfth segment crowned with two dorsal yellow spots placed transversely; dorsal and ventral surfaces separated on the second, third, twelfth, and thirteenth segments by a yellow line; legs and claspers reddish-brown. It descends to the ground and undergoes pupation just below the surface of the earth.

The MOTH appears on the wing in June, and seems to be entirely a northern species, occurring only in Yorkshire and Scotland: Mr. Birchall took it at Killarney, in Ireland, but did not find it common. (The scientific name is *Hadena rectilinea*.)



658. The Early Gray (*Xylocampa lithorhiza*).

658. THE EARLY GRAY.—The palpi are short and clothed with bristle-like scales, the terminal joint is slightly porrected and naked; the antennæ are perfectly simple in both sexes, but slightly stouter in the males than in the females: the fore wings are rather narrow, straight on the costa, and very slightly scalloped on their hind margin; their colour is gray with smoky markings; the discoidal spots have their median area gray, their circumscription dark, but very incomplete; in fact, the pale gray colour of the median area is continued below them, so that they are united at the lower extremity; there is a black longitudinal streak at the base of the wing, and there are seven or eight very dark wedge-shaped marks on the hind margin, and pointing towards the base of the wing; each of these appears attached to a very slender crescentic line on the margin itself; the fringe is very long and of a pale gray colour slightly spotted with darker gray: the hind wings are gray and slightly tinted with ochreous iridescence; they have a darker discoidal spot, a darker transverse median line, and a very slender dark line on the hind margin: the head, thorax, and body are gray, the latter is rather unusually long, and has the basal segments crested. Mr. Doubleday observes that, when fresh out of the chrysalis, the whole insect is suffused with a beautiful rose tint.

The EGG is laid in April on the slender stems of the honeysuckle (*Lonicera periclymenum*), and the CATERPILLAR feeds on the leaves of this favourite and familiar climber in June, July, and August; in the last-named month I have found it full-grown and ready to descend to the ground; it then rests in a perfectly straight position with the head porrected, and a twig of the food-plant held

firmly by its legs and claspers; the thirteenth segment is porrected, and at its extremity the anal claspers are still farther extended: when touched or otherwise annoyed, it relaxes its hold and falls rolled in a ring; the head is narrower than the second segment, and the body altogether is gradually attenuated anteriorly, but the divisions of the segments are well defined. The colour of both the head and body is ochreous-gray, the head having two blackish lines on the face, and the body having a still paler medio-dorsal stripe, intersected throughout by a slender and much interrupted darker stripe: there is an ill-defined dark brown blotch on the back of the eighth segment, and an indication of a similar blotch on the ninth segment: the medio-dorsal stripe passes through the blotch on the ninth, but not through that on the eighth segment; there are moreover on each side of the caterpillar several extremely delicate stripes both dark and light, but these are so fine as to require a lens for their definition. The CHRYSALIS has on each segment a bent line which appears as though artificially sculptured, and its anal extremity is wrinkled and squarely truncate.

The MOTH appears on the wing in March and April: it is one of the earliest Noctuas met with in the spring; it is common in our English, Welsh, and Scotch counties, and Mr. Birchall says it is also common in the county Wicklow in Ireland. (The scientific name is *Xylocampa lithorhiza*.)



659. The Purple Cloud (*Cloantha perspicillaris*).

659. THE PURPLE CLOUD.—The palpi are but slightly porrected, the second joint being clothed with bristly scales, and the terminal joint short and almost concealed; the antennæ are slightly pilose, and alike in both sexes: the fore wings are moderately wide, nearly straight on the costal margin, rather pointed at the tip, and slightly scalloped on the hind margin; their colour is purplish-brown, in some specimens approaching to rosy brown; the reniform spot is present, but not very clearly defined; the orbicular is not perceptible; a long dark streak runs from the base nearly to the middle of the wing; there is a transverse series of rather small wedge-shaped spots parallel with the hind margin: the hind wings have the median area ochreous-gray, the hind border being rather darker: the head, thorax, and body are gray-brown.

M. Guenée has described the CATERPILLAR as of a reddish-brown colour, dotted with darker brown, and as having a narrow uninterrupted medio-dorsal yellow stripe and a dorsal series of indistinct brownish chevrons: the spiracular stripe is broad, clearly defined, continuous, and bright yellow, bordered with darker yellow; the head and legs are concolorous. It feeds in July and August on several species of St. John's wort (*Hypericum*).

There are two records of the occurrence of this MOTH in England—one at Yarmouth, and the second, a wing only, at Ashford, in Kent; the latter is said to have been found in a spider's web. (The scientific name is *Cloantha perspicillaris*).



660. The Golden-rod Brindle (*Cloantha Solidaginis*).

660. THE GOLDEN-ROD BRINDLE.—The second joint of the palpi is porrected and not very bristly, the terminal joint is short, slender, and naked; the antennæ are very slightly pubescent in both sexes: the fore wings are long and narrow, the costal margin almost straight, the tip neither pointed nor rounded, and the hind margin waved; their colour is gray, with a darker median band, which, however, is very indistinct; it contains the discoidal spots; the orbiculars are three in number—two of them very small

and circular; the reniform is large and distinct, and has a white circumscription and a white centre separated from the circumscription by a smoky margin, which completely encloses it; there is a zigzag white line parallel with the hind margin, and on this rest two very distinct and acutely-pointed wedge-shaped spots, pointing towards the base of the wing; the hind wings are smoky gray; the head, thorax, and body are also dingy gray.

The CATERPILLAR is dark reddish-brown, with the slender dorsal broad spiracular line (bordered with blackish-brown) and dorsal spots pale yellow, the latter placed on a row of blackish blotches (*Hub.*). On bilberry (*Vaccinium*). (*Stainton's Manual*, vol. i. p. 281.)

The MOTH appears on the wing in August, and is exceedingly local. We are informed by Mr. Reading that Lieutenant Reed, of the 12th Regiment, took a specimen on sugar at Torquay, but its favourite counties are Lancashire, Cheshire, and Yorkshire. It is not mentioned in Mr. Birchall's Irish list. (The scientific name is *Cloantha Solidaginis.*)



661. The Red Sword-grass (*Calocampa vetusta*).

661. THE RED SWORD-GRASS.—The palpi are scarcely porrected beyond the head, their terminal joint being hardly distinguishable from the second joint; the antennæ are almost simple in both sexes, and rather unusually long: the fore wings are long and narrow, the costal margin nearly straight, the tip obtuse, the hind margin waved; their colour is wainscot-brown throughout the costal half, rich umber-brown throughout the hind marginal half; the reniform somewhat interrupts the division between these distinct shades; the orbicular is scarcely to be traced: the hind wings are smoky-brown with an ochreous iridescence: the head and collar are wainscot-brown; the disk of the thorax is very square, and entirely dark rich umber-brown; the body is pale reddish-brown.

The EGGS are laid in March and April, but the CATERPILLAR does not attain its full size until July, and then rests in a nearly straight position on the stems of scabious and other field plants, but rolls in a ring and falls to the ground if annoyed: the head is narrower than the second segment, smooth and somewhat triangular; the body is stout and uniformly cylindrical: the colour of the head is dull apple-green, the second segment has a dorsal plate of nearly the same colour; the rest of the body is also dull green, with a medio-dorsal and two lateral yellow stripes on each side; between the medio-dorsal and upper lateral stripe is a series of circular white dots, each of which is delicately bordered with black; the second segment is without these dots, the third and fourth have but two each, and the following segments as far as the eleventh have each three; the lower lateral stripe is deeper yellow, inclining to orange, and is bordered above by a very fine dark brown stripe; the spiracles are orange encircled with black; the legs are tinged with red; the claspers dull green; the belly glaucous. It feeds on sedge, dock, and various species of trefoil and scabious. When full-fed it constructs a cocoon of silk and particles of earth on the surface of the ground, and changes to a dark-brown shining CHRYSALIS, armed with a black obtuse anal point, and two approximate spines of the same colour.

The MOTH appears on the wing in September and October, coming freely to sugar, and also to the blossoms of the ivy. Mr. Reading gives a number of Devonshire localities, and going thence-northwards it has been found in most of the English counties, and still further north in the Highlands of Scotland, and in the Scottish Isles. Mr. Birchall says it is common in the counties Wicklow and Dublin, in Ireland. (The scientific name is *Calocampa vetusta.*)



662. The Sword-grass (*Calocampa exoleta*).

662. THE SWORD-GRASS.—The palpi are scarcely porrected beyond the head, their terminal joint being hardly distinguishable from the second joint; the antennæ are nearly simple in both sexes, and rather unusually long: the fore wings are long and narrow, very straight on the costa, blunt at the tip, and waved on the hind margin; their colour is ashy-gray; the discoidal spots are distinct, and nearly of the same shape, both being transversely elongate, and both also have a double and distinct dark circumscription and a paler central area except at the lower part of the orbicular, which is sienna-brown; there is an indistinct pale zigzag line parallel with the hind margin, and on this rests a single very sharp-pointed wedge-shaped spot, the tip of which is directed towards the reniform: the hind wings are smoky-gray with paler fringe: the head and collar are ashy-gray; the disk of the thorax is square and dark brown; the body is pale dingy brown.

The CATERPILLAR feeds throughout May and June, and in July, when full-fed, it rests in a nearly straight position on a stalk of its food-plant, but falls to the ground rolled in a ring if annoyed. The head is narrower than the second segment, and somewhat triangular; the body is stout and uniformly cylindrical; the colour of the head is dull apple-green, sometimes approaching to brown; that of the body is either dull apple-green or bright verdigris-green with two stripes on each side, the upper of which is bright yellow, and surmounted on each segment by a short black line, at each extremity of which is a circular pure white spot surrounded with black; the second segment has two black spots instead of white ones, and the twelfth segment has but one white spot. In the region of the spiracles is the second lateral stripe of an intense bright vermilion colour, and usually bordered both above and below with a delicate white stripe: on each segment, and resting on this white stripe, is the spiracle, also white, and accompanied on each segment from the fifth to the eleventh inclusive, with three circular white spots very similar to the spiracle; the second segment has but one such white spot, the third and fourth two each, and the twelfth none; the belly is glaucous-green; the legs reddish-green; the claspers apple-green. It feeds in meadows on a variety of plants, the most singular of which appears to me the creeping plume-thistle of the fields (*Carduus arvensis*). The way in which the delicate velvety body of the caterpillar escapes injury from the sharp thorns of the thistle is really miraculous. I have watched it for hours, and never saw it receive the slightest damage. The devil's bit scabious (*Scabiosa succisa*), the bladder campion (*Silene inflata*), and the rest-harrow (*Ononis arvensis*), are also favourite food-plants. The CHRYSALIS is reddish-brown and shining. I have found it on the surface of the earth in the breeding-cage without any cocoon.

The MOTH appears on the wing in September and October, and comes freely to sugar. It also reappears in the early spring, after hybernation; it is common in England, Scotland, and Ireland. (The scientific name is *Calocampa exoleta.*)



663. The Conformist (*Xylina conformis*).

663. THE CONFORMIST.—The palpi are porrected, and the terminal joint almost

naked; the antennæ are nearly simple in both sexes: the fore wings are narrow, the costal margin very straight, the fore and inner margins almost parallel; their colour is a beautiful purplish-gray with a mixture of reddish-brown, more particularly apparent in the reniform, and occasionally observable in a transverse waved series of small spots parallel with the hind margin; the inner margin of the wings is slightly reflexed, and inclined to red-brown: the hind wings are gray-brown, inclining to cinnamon-brown at the base: the head and thorax are of the same purple-gray colour as the fore wings; the outline of the thorax is very square; the body is flat, and of the same colour as the hind wings, but rather paler at the base.

The CATERPILLAR is figured by Hubner, and is said by Freyer to feed on alder (*Alnus glutinosa*), and birch (*Betula alba*).

The MOTH appears on the wing in September and October, and is common in those months in Austria and Germany: all that I know of it, as a British species, is contained in a report of the March meeting of the Entomological Society, published in the *Zoologist* for 1861, p. 7452, in these words: "Mr. Stainton exhibited two beautiful specimens of *Xylina conformis*, taken near Cardiff on ivy blossoms in October, 1859. The species had not hitherto been captured in Britain." There appears to have been no discussion on this subject: one would like to know why so extraordinary a capture was not made known for two years, and whether the name is given on the authority of Mr. E. Shepherd, who writes the report, or of Mr. Stainton, who makes the exhibition: it would also be pleasant to know where the specimens are deposited. I would recommend the captor or possessor of any very great rarity to submit it to Mr. Doubleday's inspection, in order that it may receive the proper name, or, at least, have the supposed name properly authenticated. (The scientific name is *Xylina conformis*.)



664. The Nonconformist (*Xylina Zinckenii*).

664. THE NONCONFORMIST.—The palpi are slightly porrected: the antennæ are almost simple in both sexes: the fore wings are rather narrow, their colour is bluish-gray in some specimens, prettily varied with darker and lighter gray in others, the colour being very confused and almost uniform: there is, however, almost invariably at the middle of the base, a curved black line which is bifurcate at the extremity, and a second short but decided black line beneath the reniform spot, and between this and the hind margin are a pair of white dots placed transversely; the discoidal spots are more or less distinct, always partaking of the colour of the general area: the hind wings are smoky-brown, rather paler at the base; the fringe is paler and intersected throughout by a median darker line: the head and thorax are of the same colour as the fore wings, the body as the hind wings.

The MOTH appears in September, and has been taken in Sweden and the north of Germany; a single specimen was reported to have been taken at New Cross, in the *Entomologist*, vol. iii. p. 203, and almost immediately afterwards Mr. Cooke, the well-known and energetic naturalist of Oxford-street, received another unnamed among some insects recently collected at Guildford. (The scientific name is *Xylina Zinckenii*.)

Obs.—The figures are copied from Herrich-Schæffer.



665. The Gray Shoulder-knot (*Xylina rhizolitha*).

665. THE GRAY SHOULDER-KNOT.—The palpi are straight and porrected, the terminal joint rather long and almost square at the extremity; the antennæ are nearly simple in both sexes; the frontal tuft at their base is four-lobed, the lobes forming a kind of square, two of which are above and two below the insertion of the antennæ: the fore wings are long and narrow, both the costal and inner margins are straight and almost parallel with each other; their colour is gray with a few darker markings; there is a short curved black line at the base, which is bifid at the extremity; and it has moreover a very short branch on the lower side half way between the base and the bifurcation; the two discoidal spots are indicated, but often rather obscurely; there is a series of eight or nine oblique dark spots on the costa, and another series of seven or eight black dots on the hind margin: the hind wings are dull ochreous-gray: the head and thorax are whitish-gray; the thorax is very square; the body brownish-gray and very flat.

The head of the CATERPILLAR is almost exactly the same width as the second segment; it is obtusely triangular and not conspicuously notched on the crown; the body is uniformly cylindrical, the divisions of the segments rather indistinctly marked, and the whole surface emitting scattered hairs: the colour of both the head and body is a pale glaucous-green, the body having five narrow stripes of a dingy-white colour, and between each two of these stripes is a series of wart-like dots of the same dingy-white colour and each emitting a bristle. The spiracles are very small and inconspicuous, they are white in black rings: the ventral is paler than the dorsal surface, it has a tinge of glaucous but very nearly approaches the same dingy-white which characterises the stripes of the dorsal surface. When full-fed at the end of May, it descends to the ground and then changes, amongst fallen leaves or grass, to a reddish-brown CHRYSALIS, which has two rather long hooked bristles at the anal extremity. I have found nothing that can with propriety be called a cocoon.

The MOTH appears on the wing in October, and in our southern counties is very commonly found at rest in the day-time on park palings and the trunks of trees; it also comes to sugar by night: it occurs in most of the English counties, but is most abundant in the western and south-western. Mr. Birchall says it is common at Killarney, and also occurs, although more rarely, in the county Wicklow, in Ireland. (The scientific name is *Xylina rhizolitha*.)



666. The Tawny Pinion (*Xylina ismibrunnea*).

666. THE TAWNY PINION.—The palpi are porrected and straight, the terminal joint is rather long and naked; the antennæ are almost simple in both sexes: the head has a four-lobed tuft, the four lobes forming a square, two being above and two below the insertion of the antennæ, and all being directed forwards; the fore wings are straight and narrow, the hind margin slightly scalloped and decidedly notched at the anal angle; their colour, as regards the costal half, is wainscot-brown, longitudinally streaked with sepia-brown, the inner marginal half being almost entirely of ths darker colour: the hind wings are gray-brown, the costal margin and fringe inclining to red, and the wing-rays being conspicuously darker; the upper lobes of the frontal tuft are sepia-brown; the thorax has three longitudinal crests or rather ridges, the middle one partially projecting over the head,

and all of them very dark sepia-brown: the body is decidedly crested on the second, and less so on the third and fourth segments, and is dark gray-brown, the crests being darker.

The MOTH appears on the wing in September and October, and comes freely to sugar, it is also attracted by ivy blossom; it occurs principally in our southern and midland counties. The name does not occur in the Irish list. (The scientific name is *Xylina semibrunnea.*)



667. The Pale Pinion (*Xylina petrificata*).

667. THE PALE PINION.—The palpi are porrected, and have the terminal joint almost naked; the antennæ are almost simple in both sexes; the frontal tuft is four-lobed, the lobes forming a square, two points being above and two below the insertion of the antennæ: the fore wings are long and narrow, the costal and inner-marginal borders being almost parallel; their colour is wainscot-brown, varied with a number of zigzag markings parallel to the hind margin: the hind wings are gray-brown, the head and thorax are wainscot-brown, the latter is almost square, and has three longitudinal crests or rather ridges, the middle slightly projecting over the head at its anterior extremity: the body is gray-brown, with a medio-dorsal series of small crests which are darker at the tips.

The CATERPILLAR is pale green, with white dorsal and lateral stripes: the head and legs are black, the claspers green (*Parfitt in litt.*). It feeds on oak (*Quercus robur*), lime (*Tilia Europœa*), &c. (*Stainton's Manual*, vol. i. 283.)

The MOTH appears on the wing in September and October, and again, after hybernation, in March and April; it is very abundant in the south-western counties, and as far north as Herefordshire. In Ireland it is widely distributed and frequently abundant. Mr. Birchall says: "I once saw an ivy bush near Tullamore, the flowers of which were swarming with this insect." (The scientific name is *Xylina petrificata.*)



668. The Mullein (*Cucullia Verbasci*).

668. THE MULLEIN.—The palpi are slightly porrected and form a conspicuous tuft beneath the head, the second joint being so densely clothed with bristle-like scales as almost to hide the terminal joint, which is short and very nearly naked; the antennæ are quite simple in both sexes; the fore wings are narrow, very straight on the costa until towards the tip, where it is finely arched; the hind margin is regularly scalloped, the notched border of the fringe making the scallops still more conspicuous; their colour is rich umber-brown along the costal margin, delicately shaded to pale wainscot-brown along the middle of the wing, the inner margin again being dark umber-brown, interrupted about the middle by two pale crescents: the hind wings are smoky-brown, paler at the base, and having the fringe also paler and intersected throughout by a darker line: the head is darkish brown, the collar delicate wainscot-brown, and raised into a very distinct crest, which is bordered behind by darker brown; the sides of the thorax are pale wainscot-brown; the body is crested and dingy-brown, with a very dark medio-dorsal stripe which is broadest immediately behind the collar, and gradually decreases into a series of points.

The head of the CATERPILLAR is slightly narrower than the second segment, and subspherical in shape; the body is very stout, slightly wrinkled transversely, and uniformly cylindrical: the colour of the head is yellowish with a few black spots, of the body pale or

whitish-green, with various yellow as well as black marks which give it a very gay appearance; on every segment is a bright yellow band extending on each side below the spiracles; this yellow band is interrupted by pure black markings which are inconstant both in their outlines and extent; they consist principally of a double dorsal series or rather two series, each composed of two marks, the anterior rather short and oval, the posterior larger, longer, and slightly bent: there are several small black marks on the sides, but I find so great difference in the extent and number of these smaller spots in different individuals, that I forego the pleasure of describing them rather than induce confusion by laying stress on characters which are certainly inconstant. It feeds principally on the woolly mullein (*Verbascum Thapsus*), and being so abundant and so conspicuous is a great favourite with all beginners in entomology: it also eats the leaves of the water-figwort (*Scrophularia aquatica*): when full-fed it descends to the ground, and binding together particles of earth with silk, forms a tough cocoon, in which it changes to a greenish-brown CHRYSALIS, of which the case containing the legs is much elongated, and that which contains the wings is almost colourless, but appears greenish in consequence of being so transparent.

The MOTH appears on the wing in April, and is common in the south-western and southern counties of England, but rarely occurs northwards. I have known the time when I could readily have obtained a quart of its beautiful caterpillar from the mulleins in the hedgerows about Darenth and Green-street Green; and Mr. Mathew, in Mr. Reading's "List of the Lepidoptera of Cornwall and Devonshire," says: "The extreme abundance of the caterpillar of this species on Braunton Burrows, in the summers of 1858, '59, and '60, is worth mentioning. Every plant of *Verbascum Thapsus* was completely covered with them; the caterpillars in July varying in size from the juvenile just hatched to the full-fed individual ready to burrow in the sand. I am positive that had anyone desired to have taken ten or twenty thousand, it might easily have been done." It is common in the counties of Dublin and Wicklow, in Ireland. (The scientific name is *Cucullia Verbasci.*)



669. The Water Betony (*Cucullia Scrophulariæ*).

669. THE WATER BETONY.—The palpi are slightly porrected and form a rather conspicuous tuft beneath the head, the second joint being so densely clothed with bristle-like scales as almost to hide the terminal joint, which is short and very nearly naked; the antennæ are quite simple in both sexes: the fore wings are narrow and the costa very straight until near the tip, where it is finely arched; the hind margin is regularly scalloped and the fringe notched, adding thereby to the scalloped appearance; their colour is umber-brown along the costal margin, delicately shaded to wainscot-brown along the middle of the wing; the hind margin is dark brown, interrupted about the middle by two pale approximate crescents: the hind wings are gray-brown, much paler towards the base, and with the wing-rays darker; the hind margin is scalloped; the fringe is pale and intersected throughout by a darker line: the head is dark brown, the collar very delicate wainscot-brown and raised into a crest, the sides of the thorax are also wainscot-brown; the body is pale brown and crested with a medio-dorsal stripe of darker brown, this is broadest at the base, and gradually decreases in breadth as well as in intensity towards the tip.

The head of the CATERPILLAR is narrower than the second segment, sub-spherical, and slightly porrected; the body is cylindrical and slightly wrinkled transversely; the divisions of the segments are clearly defined; the colour of the head is pale greenish-yellow,

with a few black markings; of the body pale or whitish-green, with bright yellow and black markings, which give it a very gay appearance: on the back of each segment is a yellow band interrupted by a black mark, which consists of two oval spots and a transverse band, each black spot is united to the band by a very slender black line, so that the oval spots, the transverse band, and the connecting lines unite in forming a compound ornamentation on the back of each segment. It feeds on figwort (*Scrophularia nodosa* and *S. aquatica*), and on the moth mullein (*Verbascum Blattaria*), and is full-fed in July, when it descends to the ground forming a tough cocoon of silk and earth, in which it changes to a greenish-brown CHRYSALIS, with semi-transparent and almost colourless wing-cases.

The MOTH appears on the wing in May, and seems to be confined to the southern and western counties of England. It is extremely difficult to distinguish this from the preceding species when in the perfect state, and, therefore, I refrain from giving localities: the caterpillars of the two seem equally difficult to separate, but I have trusted for my description of the present species to the exquisite figures and minute description in Boisduval's "Collection des Chenilles." (The scientific name is *Cucullia Scrophulariæ*.)



670. The Striped Lychnis (*Cucullia Lychnitis*).

670. THE STRIPED LYCHNIS.—The palpi are slightly porrected, the second joint being scaly but not very densely so, the terminal joint is scarcely perceptible; the antennæ are perfectly simple in both sexes; the fore wings are very straight on the costa until near the tip, and then slightly arched; the hind margin is scalloped; their colour is wainscot-brown with a black-brown costal margin and a black-brown inner margin, interrupted in the middle by two minute pale crescents, and towards the anal angle by several pale lines; the hind wings are very pale at the base, often almost white, but darker and smoke-coloured towards the hind margin; the collar is very pale and raised in the form of a crest; the hinder part of the thorax and body are very pale brown, the latter having a medio-dorsal stripe almost black; this is broad at the base, and very narrow and indistinct towards the tip.

The head of the CATERPILLAR is rather narrower than the second segment, slightly porrected, and somewhat triangular; the body is stout, cylindrical, and slightly wrinkled transversely; the colour of the head is greenish-yellow, with five or six black dots on each cheek; of the body, dingy white with a slight tendency to glaucous-green, each segment has a transverse yellowish band, and a compound black mark which consists of a transverse band slightly indented in the middle and bent forward at both extremities; and anterior to this are two oval black spots joined to the band by connecting lines; the second segment has a double series of small black spots in the place of the ornamentation I have attempted to describe; the third segment has the ornamentation divided into spots, and the twelfth segment has only a transverse series of black spots: it feeds on the flowers and seed-pods of the white mullein (*Verbascum Lychnitis*), and the black mullein (*V. nigrum*), and is full-fed in July and August, when it spins its tough cocoon on the surface of the ground, and in this changes to a smooth brown CHRYSALIS.

The MOTH appears on the wing in June and July, and appears confined to the southern districts of England; the neighbourhood of Arundel seems to be the principal locality. It is at present entirely unknown in Scotland or Ireland. (The scientific name is *Cucullia Lychnitis*.)

Obs.—In this species I have relied on Boisduval's "Collection des Chenilles" for the description of the caterpillar.



671. The Star-wort (*Cucullia Asteris*).

671. THE STAR-WORT.—The palpi form an obtuse tuft in front of the head, and the terminal joint seems emerging from the surrounding scales; the antennæ are perfectly simple in both sexes: the fore wings are narrow and nearly straight along the costa, but gradually arched towards the tip, which is blunt; the hind margin is entire; their colour is umber-brown on the costal margin, gradually shading to slate-colour towards the middle of the wing; there is an indistinct indication of both discoidal spots; the inner margin is dark brown, this colour being very narrow from the base to beyond the middle, then expanding and containing a distinct whitish crescent: the hind wings are gray-brown with paler fringe: the head, thorax, and body are slaty gray-brown with a rather darker but not very distinct medio-dorsal stripe.

The CATERPILLAR has a rather small and somewhat triangular head, and a long cylindrical body, attenuated towards both extremities, very different from that of those obese caterpillars I have been describing; the colour of the head is pale or glaucous-green, the prevailing colour of the body is olive-green with a narrow medio-dorsal stripe bright yellow; then follow on each side two narrow bluish stripes, and lastly, in the region of the spiracles another stripe, which is sometimes partly yellow and partly white, and sometimes entirely yellow; the spiracles are yellow delicately margined with black: it feeds on the golden rod (*Solidago Virgaurea*), on the sea star-wort (*Aster Tripolium*), and on China asters in gardens.

The MOTH appears on the wing in June: it is common at Darenth wood, and in Tilgate forest, and has occurred at Brighton and Lewes, and occasionally at West Wickham. (The scientific name is *Cucullia Asteris.*)



672. The Cudweed (*Cucullia Gnaphalii*).

672. THE CUDWEED.—The palpi are inconspicuous, the tip only of the terminal joint appearing in front of the head: the antennæ are simple in both sexes: the fore wings are rather narrow, the costa straight for three-quarters of its length, and then bent towards the tip, which is pointed; their colour is grayish-ash, with the median area brownish; this colour forms a kind of median band in some specimens, but in others a cloudy ash-colour pervades the whole wing; the discoidal spots are defined but of irregular form; the orbicular has a slender black circumscription; the reniform is of irregular form and colour, and its median area is divided into five, six, or even seven compartments; in the dark suffused specimens there is a defined and acutely-angled white mark between the reniform and the inner margin: the hind wings are smoky-brown, inclining to testaceous-brown at the base, the wing-rays being darker and the fringe paler: the head and thorax are gray-brown, the latter somewhat crested; the body is brown with a darker medio-dorsal stripe, which forms a crest on the first, second, and third segments.

I am indebted to Boisduval's beautiful "Collection des Chenilles" for the following particulars of the CATERPILLAR, which I have never seen. It lives singly on the golden rod (*Solidago Virgaurea*), throughout the month of July and in the beginning of August, and rests with its belly closely appressed to a twig of that plant, with its head downwards, and sometimes even resting on another plant; in

this singular position it is by no means easy to detect, because the colour of its medio-dorsal stripe much resembles that of a stem of the food-plant. It is extremely active, and when touched throws itself on the ground, and continues to twist itself about with great energy : the head is rather narrower than the second segment; the body is attenuated towards both extremities, and the divisions of the segments are not very clearly defined; from every part of the head and body spring a few very slender and very inconspicuous scattered hairs : the colour of the head is apple-green, with a reddish band on the hind part of the crown, which is often concealed by the anterior margin of the second segment; the colour of the body is apple-green with a broad medio-dorsal red or violet compound stripe, rather narrowed at both ends and bordered by a brown line; the spiracles are yellow, delicately circled with black, and each is situated in an oblique shuttle-shaped mark of the same colour as the medio-dorsal stripe; all the markings are delicately outlined in black; the ventral area is blue or glaucous-green, with five approximate, narrow, and rather indistinct white stripes; the legs and claspers are of the same colour as the body. It feeds on the golden-rod, and when full-fed descends to the ground, and there constructs an oval cocoon of considerable strength and solidity by the intermixture of silk and earth, and in this cocoon changes to a CHRYSALIS of a pale yellowish-green colour, with red-brown incisions; the cases of the wings and thorax are also yellow-green and very transparent; the anal extremity is dark brown, dilated, and spatulate.

The MOTH appears on the wing in June : Mr. Doubleday has three British examples of this insect, which were raised from caterpillars found feeding on the golden-rod in Darenth wood. This species was described by the late Mr. Stephens in his "Illustrations of British Entomology," vol. iii. p. 87, under the name of *Cucullia thapsiphaga*, in 1829, and figured in the "Transactions of the Entomological Society of London," vol. ii., pl. iii., fig. 7, under the name of *Cucullia Solidaginis*, in 1837. (It is without doubt the *Cucullia Gnaphalii* of continental authors.)



673. The Wormwood (*Cucullia Absynthii*).

673. THE WORMWOOD.—The palpi are inconspicuous, the terminal joints only just appearing in front of the frontal tuft; the antennæ are simple in both sexes : the fore wings are narrow at the base, but considerably wider opposite the anal angle; the costa is straight for three-quarters of its length, and then bends gradually towards the tip; their colour is ashy-gray tinged with pale purple, and having numerous dark markings both transverse and longitudinal; these are principally noticeable, first, as forming a transverse band before the orbicular, and this band is interrupted by a pale zigzag line; and secondly, occupying the space between the discoidal spots, but connected with this, is a cloud on the hind margin below the reniform; the usual discoidal spots are singularly distorted and divided, each appearing as an assemblage of four or five squarish black spots; on the hind margin is a row of eight black spots : the hind wings are pale gray, slightly suffused with saffron, and also slightly clouded towards the fringe, which is pale : the head is adorned with two pale transverse lines before the antennæ; the crown, eyes, and collar are almost black; then follows a band of almost pearly whiteness; the body is silvery-gray with a medio-dorsal series of small dark crests.

The head of the CATERPILLAR is narrower than the second segment; it is somewhat triangular; the body is rather short and obese with the segmental divisions clearly defined; the colour of the head, and also of the second segment, is dull pale reddish-gray; the ground-colour exhibited chiefly at the incisions or

the segments is green: the figure in Boisduval's "Collection des Chenilles" has a purple-brown back interrupted by eight whitish dots on each segment, and three or more oblique white lines; there appears to be rather an unusual number of bristle-like hairs: the ventral surface is green with many longitudinal streaks; it is found from July to the end of September feeding on the common wormwood (*Artemisia Absynthium*), and its mixed colours so exactly correspond with those of the blossoms that it is extremely difficult to detect except after rain, when the plant assumes a more vivid green, which contrasts with the colour of the caterpillar. When full-fed it constructs a tough oval cocoon of mixed silk and earth, and in this changes to a CHRYSALIS of a yellowish-green colour, with a brown case inclosing the legs.

The MOTH, according to Boisduval, appears in June and September, according to Guenée and Mr. Reading, in July. In this country it seems confined to the southern counties of England, particularly Cornwall. Mr. Reading says: "For this rare and very distinct insect there are in Cornwall and Devon three widely separated districts in which it is found. In 1855-6 the caterpillar was found near Wembury feeding on wormwood; Dr. Cocks records it as occurring at Falmouth; and Mr. Dorville, by cultivating the food-plant, has been able to procure the insect at Alphington, near Exeter." Mr. Dale has taken it in Dorsetshire, and Mr. Harpur Crewe in Berkshire. (The scientific name is *Cucullia Absynthii*.)



674. The Chamomile Shark (*Cucullia Chamomillæ*).

674. THE CHAMOMILE SHARK.—The palpi form a conspicuous tuft beneath the head, and from this the tips of the terminal joints slightly project; the antennæ are simple in both sexes; the wings are narrow, nearly straight on the costa, but curved and pointed at the tip; their colour is smoky-gray, with a very sharply-defined but slender line from the base to the middle of the wing; the wing-rays are also dark, and opposite the extremity of each is a corresponding black line in the fringe: the hind wings are gray-brown with paler base and darker wing-rays; the head, thorax, and body are gray, the thorax having a sharp keel-like crest in some specimens porrected over the head; the body has three smaller crests each tipped with darker brown.

The EGG is laid at the end of April or beginning of May, on the stems of the wild chamomile or feverfew (*Anthemis Cotula*): the young CATERPILLAR emerges at the end of May or during the first week in June: when first hatched it is light green, and is generally to be found coiled round the unexpanded flower-bud; it grows with great rapidity, and scarcely three weeks elapse from its being found in this diminutive state to its acquiring its full size, which is generally at the end of June, although stragglers may be occasionally found as late as the third week in July; from the 12th to the 20th of June may, however, be regarded as the best season for collecting these caterpillars: they are extremely partial to waste places, such as shipwrights' yards and amongst old timber, and are very local, often occurring abundantly in one spot, and being entirely absent from another apparently similar. They do not hide during the day, as is so frequently the case with the larvæ of Noctuas, but bask in the sunshine, and continue feeding, more especially on the flowers of their food-plant, amongst which they make great havoc. When full-fed the head is rather narrower than the second segment; the body is uniformly cylindrical and somewhat shining; the twelfth segment has its dorsal surface prominent, yet scarcely elevated above the plane of the back: the colour both of head and body is either pale olive-green or pale pinkish-brown; in either case the body is adorned with six nearly equidistant waved stripes of the same colour, but of a darker

shade: these waved stripes are invariably bordered throughout by a delicate waved marginal line of a still darker hue, and are also intersected on each segment by a transverse interrupted band, in which reddish-pink is the predominant colour: the ventral surface, legs, and claspers are less variegated, having a dull homogeneous tint of obscure pink and green. When full-fed the caterpillar buries itself very deep in the earth or rubbish, and forms a tough cocoon, in which particles of earth or sand, or even fragments of leaves or little sticks, are intermixed and interwoven: sometimes when a considerable number of these caterpillars have been confined together, they will bury themselves in company, and their cocoons will be connected together, adhering after the fashion of a bunch of grapes.

The MOTH appears on the wing in April and May; it is generally but not plentifully distributed in our English and Irish counties. Mr. Reading says: "The caterpillar in Cornwall and Devonshire is found abundantly on *Pyrethrum inodorum* and *maritimum*, but not on *Anthemis* or *Matricaria*." (The scientific name is *Cucullia Chamomillæ*.)



675. The Shark (*Cucullia umbratica*).

675. THE SHARK.—The palpi form a conspicuous tuft beneath the head, the tips of the terminal joints being scarcely perceptible; the antennæ are simple in both sexes: the fore wings are narrow, nearly straight on the costa, but slightly arched towards the tip; their colour is smoky-gray with a slender but very distinct black line from the middle of the base to the middle of the wing; the wing-rays are also black, but I find that the dark colour is not continued into the fringe: the hind wings are smoky-gray, with the wing-rays darker and the base paler: the head is smoky-black, the thorax is gray and crested, the body is smoky-gray and scarcely crested.

The EGG is laid on the leaves of lettuce (*Lactuca virosa*), and on several species of sowthistle (*Sonchus arvensis*, *S. oleraceus*, and *S. palustris*), in June and July, and the CATERPILLAR, which emerges in July, devours the leaves of these species, as well as those of the garden lettuce, sometimes doing great injury to the latter: it eats only by night, and secretes itself by day under those lower leaves which lie prostrate on the ground, or are so bent over as to afford perfect concealment. When full-fed it may be readily found in this situation, reposing in a straight position on the under surface of a leaf, with its back downwards; when annoyed it falls from its food-plant, and twists its head right and left in an angry manner, sometimes stretching it out in a leech-like fashion; but I have not observed it feign death or roll in a ring. The head is considerably narrower than the body: the body is cylindrical, and of nearly uniform size throughout, the dorsal surface being transversely wrinkled and delicately shagreened. The colour of the head is black, but not shining; the body dark brown or nearly black, delicately reticulated with pale smoke-colour, the reticulations being depressed, the darker warts raised; the dorsal surface of the second segment is darker than the rest, and its margin is adorned with seven orange spots, which appear somewhat as the anterior extremities of stripes which have become almost obsolete, but are to be traced along the back and in the region of the spiracles, and three of which appear conspicuously on the twelfth segment, and converge at the extremity of the anal flap; the ventral surface is paler than the dorsal; the legs are black and shining; the claspers black at the base and white at the extremities, their hooks black. The CHRYSALIS is subterranean.

The MOTH appears on the wing in June, and may frequently be observed resting on park palings, which it exactly resembles in colour.

It is generally distributed in England, Scotland, and Ireland. (The scientific name is *Cucullia umbratica.*)



676. The Bordered Sallow (*Heliothis marginatus*).

676. The Bordered Sallow.—The palpi are slightly porrected and ascending, the tips are incurved on approaching the summit; the antennæ are simple in both sexes: the fore wings are ample, straight on the costa and pointed at the tip; their colour is orange-brown with a broad purplish hind-marginal band; the discoidal spots have a slender but distinct circumscription of darker brown, and there are six transverse lines; the first very short and close to the base; the second zigzag and before the orbicular; the third elbowed and beyond the orbicular; the fourth oblique and beyond the reniform; the fifth zigzag and intersecting the purple hind-marginal band; the sixth on the margin: the hind wings are cloudy at the base with a smoke-coloured discoidal spot, then ochreous with a brown smoky hind-marginal band and a pale fringe: the head and thorax are rich orange-brown, the body testaceous-brown.

The caterpillar feeds on the common rest-harrow (*Ononis arvensis*), and is full-fed towards the end of August, when it rests with the anterior segments slightly elevated and arched, and the head tucked in, the attitude being somewhat Sphinx-like; when annoyed it falls off its food-plant, rolling itself in a ring and feigning death; in confinement, like so many other caterpillars, it feeds greedily on knot-grass (*Polygonum aviculare*). The head is porrected in crawling and narrower than the second segment, into which it is partially received: the body is almost uniformly cylindrical, but has the twelfth and thirteenth segments rather attenuated and depressed; the skin is densely covered with a velvety pile of very short bristles, intermixed with longer hairs. The colour of the head is pale apple-green and shining; of the body dull apple-green, the dorsal darker than the ventral surface, and sprinkled with white spots, certain of which form four longitudinal series; it also has numerous black dots, each of which culminates in an acute point; these black dots are particularly crowded along each lateral margin of the dorsal surface: the dorsal surface is bounded by a narrow white lateral stripe, extending from the head to the anal claspers; on the upper margin of this are seated the spiracles, which are nearly circular, of a testaceous-brown colour, and surrounded by a black ring: the inferior margin of the white lateral stripe is shaded off into green; the ventral surface is spotted with white.

The moth appears on the wing in May and June, and seems to be widely distributed in our English counties, from Cornwall to the Lake District. It seems particularly common in Cornwall and Devonshire, the caterpillar having been found in great abundance on the rest-harrow. Mr. Douglas Robinson reports it from Scotland, but we have at present no record for Ireland. (The scientific name is *Heliothis marginatus.*)



677. The Bordered Straw (*Heliothis peltiger*).

677. The Bordered Straw.—The palpi are porrected and connivent at the tips, which are almost without scales; the antennæ are almost simple, and very slender in both sexes: the fore wings are ample, almost straight on the costa, produced and rather pointed at the tip; their colour is ochreous-gray; the orbicular is absent; the reniform is smoky-black, and connected with the costal margin by a blotch of somewhat similar colour; near the apex is another darkish blotch on the costa,

which forms the commencement of a dark transverse line parallel with the hind margin; there is also a small black spot near the anal angle; the hind wings are very pale, with a crescentic discoidal spot and a broad smoky hind margin, which contains a pale median blotch: the head, thorax, and body are of the same colour as the fore wings.

The CATERPILLAR rests in a perfectly straight position on the leaves, especially selecting the ribs, of the common henbane (*Hyoscyamus niger*); it eats both the leaves and ribs, and some of the smaller caterpillars bury themselves in excavations which they make in the latter; they roll themselves in a lax ring when annoyed. The head is narrower and smaller than the second segment, in which it is partially concealed; the segmental divisions are strongly marked, and each has four dorsal and four lateral warts, each wart emitting a rather long bristle, so that every segment has twelve of these bristles, which being white are rather conspicuous; there are other smaller bristles on the belly; with these exceptions the body is uniformly cylindrical; there are ten claspers, fully and uniformly developed; the colour of the head and body is pale dull green, sprinkled with white dots, and having three darker dorsal stripes not very distinctly pronounced; after the last change a tawny patch occupies the dorsal area of each segment, near the extreme margin of which are situated the spiracles, which are white surrounded by a slender black ring, and this again by a whitish ring: the legs and claspers are nearly concolorous with the body, but more transparent.

The MOTH appears on the wing in June, and is very uncertain in its occurrence. Of this species Mr. Reading says:—"More frequent on the coast than inland. Has a wide range coastwise in the two westernmost counties. So uncertain, however, are the seasons of its occurrence, that it might with propriety be termed either very common or very rare. In the years 1853 and 4 the caterpillars of this insect were found in great abundance in most of the bays that skirt the coast from Looe Island to Berryhead—many patches of *Ononis*, var. *Spinosa*, covering an area of not more than two feet superficial, yielding as many as 300 caterpillars. More that two thousand were collected, and many left, in all likelihood to the number of thousands. It appeared thus plentifully during the two seasons mentioned; but since those periods the insect, in any stage, has not been observed in numbers that would warrant its being considered common. Indeed, throughout whole seasons not one specimen falls to the share of even the industrious lepidopterist. The caterpillars vary considerably in colour. As many variations are to be seen in this as are met with in its congener *H. marginatus*. The two forms described below are those usually found.

"*No.* 1.—Deep green, scattered short bristly hairs; dorsal, sub-dorsal, longitudinal, and transverse lines deeper; spiracles, spiracular line, and scattered spots, white.

"*No.* 2.—Same markings as in No. 1; but the whole ground-colour is chromish-red, inclining to pink.

"The caterpillar of No. 2 is found feeding upon the bright petals of *Ononis spinosa*, the hue of which is shed through the transparent skin of the caterpillar, whilst No. 2 feeds on the leaves and seeds of one or more of its food-plants. The food-plants of the caterpillar are: *Ononis spinosa* and *arvensis* (merely two forms of one species; occurs commonly along the coast as well as inland); *Arenaria rubra*, a common rock-plant; *Hyoscyamus niger*, Whitsand-cliffs; *Pyrethrum inodorum* and *maritimum* (both being forms of one plant); common on the coast and near thereto—caterpillars feed on the anthers of this plant, like those of *Polia serena* on a similar part of a *Sonchus*. The caterpillars on *Pyrethrum* are yellowish-green, the yellow anthers imparting some of the colouring matter with which they are charged, to the caterpillar; whilst the pollen gives a stronger tinge of the same to the external covering, by adhering to the hairs of the insect. Full-grown caterpillars are found in the beginning of August, but partially-grown are to be obtained from as early as May.

"The moth flies in September, and in spring and summer, not double-brooded, but semi-

brooded twice a year; one portion coming forth soon after the completion of the chrysalis condition, and the other portion, or part of it, remaining in the chrysalis state till the next season; whilst sometimes it happens that a few keep to the chrysalis covering for one, two, and even three years."

This species has also occurred in the counties of Somerset, Gloucester, Dorset, Hants, Sussex, Surrey, Kent, Cambridge, and Cheshire, and in Wales. (The scientific name is *Heliothis peltiger*.)



678. The Scarce-bordered Straw (*Heliothis armiger*).

678. THE SCARCE-BORDERED STRAW.—The palpi are porrected and connivent, the terminal joint almost naked; the antennæ are simple or nearly so; the fore wings are straight on the costa, produced, and almost pointed at the tip; their colour is dingy ochreous-brown, the orbicular being visible as a small dot, the reniform conspicuous and dark brown; there is a transverse narrow band of dingy brown parallel with the hind margin: the hind wings are paler, with a crescentic discoidal spot and a broadish smoke-coloured hind-marginal band, interrupted by a median paler blotch: the head, thorax, and body are dingy brown.

The CATERPILLAR has a smooth and shining porrected head, about equal in width to the second segment of the body, which is rather slender, cylindrical, attenuated behind, and sparingly covered with scattered hairs; the colour of the head is smoky-brown, as also that of the second segment of the body, which is covered by a leathery plate; the general colour of the body is dingy brown; with a medio-dorsal stripe darker brown; there is a yellow lateral line which includes the spiracles, which are black, and encircled first with a yellowish, and then with a black ring, both of them very delicate; between the medio-dorsal and spiracular stripes the body is pale greenish-brown, with numerous slender streaks both paler and darker than the ground-colour, and on each segment are two wart-like dots. I have never possessed this caterpillar, and have been obliged to describe it from continental figures.

A local and very uncertain species; the MOTH flies generally by day, in September and October, but also comes to sugar; it has been taken at Hoe, Plymouth, Teignmouth, Alphington near Exeter, Barnstaple, &c., in Devonshire; also in Somerset, Dorset, Hampshire, Sussex, Surrey, Kent, Essex, Cambridge, and, according to Mr. Stainton, in the Lake District; but I think not in Scotland or Ireland. (The scientific name is *Heliothis armiger*.)

Obs.—This insect is truly cosmopolitan. I have seen specimens from the United States, South America, and almost every part of continental Europe; and to-day Mr. Bond has shown me others from Australia and India. Dr. Horsfield records it as an inhabitant of Java, and figures the caterpillar and chrysalis. The caterpillar is supposed by many to be the army-worm so destructive in the United States to the cotton crop; but this is a matter of grave doubt, and I would particularly refer the reader to papers by Mr. Birchall and Mr. Muller on this subject, at pp. 166 and 213 of the third volume of the *Entomologist*.



679. The Marbled Clover (*Heliothis dipsaceus*).

679. THE MARBLED CLOVER.—The palpi are decidedly porrected and slightly ascending, the tips pointed; the antennæ are simple in both sexes; the fore wings have the costal margin almost straight, the tip scarcely pointed, and the hind margin oblique; their colour is dingy pale olive-brown; the orbicular is a mere spot; the reniform is large and conspicuous, and forms part of an indistinct and

sometimes interrupted median transverse band; halfway between this and the hind margin is a second band still less distinct and paler; on the hind margin is a series of dark dots: the hind wings are very pale ochreous-white with a large black discoidal spot and a broad black hind-marginal band, which is interrupted by a pale ochreous spot about the middle; the fringe is pale: the head, thorax, and body are of the same colour as the fore wings.

The CATERPILLAR is described by Guenée as straw-colour, strongly striated with reddish-brown, and having a broad continuous medio-dorsal stripe of a violet-brown colour; the spiracular stripe is concolorous and margined below with brown; on every segment there is a broad transverse reddish spot which reaches from one spiracular stripe to the other; the spiracles are black; the head is very pale, the crown covered with black dots: it feeds on a great number of low-growing plants, especially the common yellow snap-dragon (*Linaria vulgaris*).

The MOTH appears on the wing in July, and has been taken in Dorsetshire, Hampshire, Surrey, Kent, Suffolk, and also, it is said, in Yorkshire. (The scientific name is *Heliothis dipsaceus.*)



680. The Broad-bordered White Underwing (*Anarta melanopa*).

680. THE BROAD-BORDERED WHITE UNDERWING.—The palpi are porrected and clothed with bristle-like scales, the terminal joint having the same character; the antennæ are slender and simple in both sexes: the fore wings are nearly straight on the costa, produced at the tip, and obliquely convex on the hind margin; their colour is smoky-gray, clouded, and transversely lined with black; the discoidal spots are inconspicuous, but still readily to be traced; the fringe is spotted black and white: the hind wings have a broad band of smoky-black on the hind and inner margins, and a black crescentic discoidal spot; the median disk and fringe are white: the head, thorax, and body are smoky-black, the last a little varied with gray.

The MOTH appears on the wing in June, and so far as Great Britain is concerned, it was first discovered by Mr. Hewitson, in the Shetland Islands, and subsequently by Mr. Weaver, at Rannock, in Perthshire. (The scientific name is *Anarta melanopa.*)



681. The Small Dark Yellow Underwing (*Anarta cordigera*).

681. THE SMALL DARK YELLOW UNDERWING.—The palpi are porrected and rather conspicuous; the second joint is clothed with bristly scales but is very slender at the base; the terminal joint is also very scaly; the antennæ are simple in both sexes; the fore wings are straight on the costa and blunt at the tip, their colour is smoky-black; the reniform is white and very conspicuous, the orbicular obsolete; there are two slender zig-zag gray lines, one before the usual site of the orbicular, the other beyond the reniform; the fringe is spotted with black and white; the hind wings are yellow, with a black marginal band and a white fringe; the head is black, the thorax black, with two minute discoidal white dots, and a larger one in the situation of the scutellum; the body is black and hirsute.

The CATERPILLAR is reddish-ochreous, the medio-dorsal stripe is brownish-ochreous, with an oblique brownish streak meeting it on each segment; the spiracular line is whitish anteriorly, the spots and spiracles are white (*Hub.*). It feeds on *Vaccinium.* (*Stainton's Manual*, vol. i., 293.)

The MOTH appears on the wing in May, and, so far as Great Britain is concerned, has only been taken at Rannoch, in Perthshire. (The scientific name is *Anarta cordigera.*)



682. The Beautiful Yellow Underwing (*Anarta Myrtilli*).

682. THE BEAUTIFUL YELLOW UNDERWING.—The palpi are rather porrected and ough with bristle-like scales; the antennæ are simple in both sexes: the fore wings are straight on the costa, and produced but scarcely pointed at the tip; their colour is bright red-brown with a very conspicuous and somewhat triangular median white spot, this spot usually projects an acutely wedge-shaped lobe towards the base of the wing; there are several transverse gray lines either waved or zigzag: the hind wings are bright yellow at the base and have a broad black hind-marginal band: the head and thorax are of the same colour as the fore wings; the body smoky-black delicately ringed with gray.

The CATERPILLAR, when full-fed, rests with the second, third, and fourth pairs of ventral claspers, as well as the anal claspers, firmly attached to the food-plant, the anterior part of the body raised, and the head bent under, sphinx-like; the first pair of claspers are held free: when disturbed it falls from its food-plant and rolls into a compact ring, but does not long retain that position, soon unrolling itself and crawling with considerable activity. The head is of the same width as the second segment, the cheeks rounded, the crown not conspicuously notched, the whole extremely glabrous, yet emitting several bristles: the body is uniformly cylindrical. The colour of the head is pale transparent green, with a number of dark brown dots; the second segment of the body has a dull green plate occupying its entire dorsal surface; the remainder of the body is olive-green, decorated with numerous pale markings; there is a medio-dorsal series of eleven spots, all of them guttiform or elongate-oval; on each side is a series of eleven spots, almost semicircular, but not perfectly so; and each of these is divided at the junction of the segments: there is still another series in the region of the spiracles, and these are more united, forming a zigzag line; the spiracles themselves are white; each is surrounded by a black ring; the ventral surface has a chain-like series of pale markings, extending to all the segments except the second, third, fourth, and thirteenth: the legs and claspers are of the ground-colour, but each has a pale streak at the base, and on all parts of the body are numerous smaller markings intervening between those I have described: these various markings are far from constant in form, number, or colour; their ordinary colour is an impure white, but sometimes they are pure white, and sometimes tinged with yellow; in one specimen I find the lateral series alternately pure white and dingy white; the dorsal area also varies in tint, bright green, olive-green, olive-brown, and bottle-green; and the lateral ornamentation is sometimes varied with a darker ground-colour, encroaching on and almost eclipsing the paler markings. It feeds on heath (*Erica vulgaris*), and when full-fed spins a cocoon on the surface of the earth, mixing grains of sand with its silk.

The MOTH appears on the wing in June, and is common on the heaths of most of our southern and south-eastern counties. Mr. Reading says it is local and scarce in Cornwall and Devonshire, but he gives several localities where it has been taken, as Bickleigh Down; Brent-hill, near Tavistock; St. Clear Down, Falmouth, Torquay, and Haldon. Tracing its progress northwards, it seems to occur here and there in all the north-English and Scotch counties, and Mr. Birchall says it is generally distributed and common in Ireland. (The scientific name is *Anarta Myrtilli*.)

Obs.—The upper figure represents the insect in its natural position when at rest.



683. The Small Yellow Underwing (*Heliodes Arbuti*).

683. THE SMALL YELLOW UNDERWING.—The palpi are rarely porrected beyond the frontal tuft; the antennæ are slender and simple in both sexes; the fore wings are rather ample, they have a nearly straight costal margin and a pointed, but not acutely pointed, tip; their colour is rich mahogany-brown sprinkled with a few white scales, and having a median as well as a hind-marginal darker shade; the fringe is black at the two extremities and in the middle, the rest being rich orange-colour: the hind wings are black, with a median transverse deep yellow blotch and a pale fringe: the head and thorax are dark brown; the body is very slender and smoky-black, with narrow gray belts.

The CATERPILLAR is described by Guenée as having a pale green or gray-green head, body, and legs; the medio-dorsal stripe deeper green and bordered on both sides with white, the sub-dorsal stripe lighter, and the spiracular stripe white, bordered above with darker green or gray. It feeds on field chickweed (*Cerastium arvense*), and changes to a CHRYSALIS on the surface of the earth.

The MOTH appears on the wing in May and June; it is generally distributed in Great Britain, being very abundant in Cornwall, not uncommon in Devonshire, and so on eastwards and northwards, even extending into Scotland, but I cannot learn that it has ever been observed in Ireland. (The scientific name is *Heliodes Arbuti*.)

Obs.—Engramelle, who calls this little insect *La Polynome*, represents a variety with the hind wings white, a very unusual circumstance; it is very little subject to variation. It is the *Heliaca* of the Vienna Catalogue, *Fasciola* of Esper, *Domestica* of the Naturforscher, and *Policula* of others; so that Engramelle's French name is very appropriate.



684. The Spotted Sulphur (*Agrophila sulphuralis*).

684. THE SPOTTED SULPHUR.—The palpi are decidedly porrected, very sharp-pointed, and moderately distant from each other; the antennæ are very slender and alike in both sexes; the fore wings are very nearly straight on the costa and scarcely pointed at the tip; their colour is sulphur-yellow, with two transverse black bars parallel with the hind margin, two longitudinal black stripes parallel with the inner margin, and five black spots in the area enclosed between the inner black bar, which is often interrupted or broken up into spots, and the upper black stripe: I find no trace of the discoidal spots; the fringe is black, slightly interrupted at the costal end with whitish-yellow; the hind wings are smoky-black; the face is yellow, the crown of the head black; the thorax is black on the median disk, yellow on the sides; the body is belted with black and yellow, but neither colour very bright.

The following particulars of the CATERPILLAR have been kindly handed me by Mr. Hellins, at the request of Mr. Brown, of Cambridge, who procured him the eggs:—"Unfortunately, only one egg reached me uninjured, and the solitary caterpillar died when it seemed just about to change; it was hatched June 25th and died August 15th. The food which I gave it, and which it seemed to eat readily, was the field bindweed (*Convolvulus arvensis*), and for the first half of its life two small shoots, bearing five or six little leaves, sufficed it both for food and resting-place. When first hatched it was of a dingy gray colour, with four black transverse humps on as many of the middle segments; but at each moult these humps became less and less prominent,

until they disappeared entirely. When full-grown, the caterpillar is about an inch long, cylindrical, and having the segmental divisions deeply indented; the claspers are six in number, four ventral and two anal; the body is thickest at the fourth segment, and when at rest is usually bent in a curve from the middle. The colour is a rich chocolate-brown; the medio-dorsal stripe is rather darker, but edged with very fine paler lines; the sub-dorsal stripe is also darker, but very faintly marked; the spiracular stripe is broad, of a pale yellow, with a fine brown thread running through it; after the last moult there are some deep yellow and orange spots in it also, but these soon disappear, as do the usual dorsal dots, which at first are black and plainly visible."

The MOTH appears on the wing in June, but has only been taken in three of our English counties, and neither in Wales, Scotland, nor Ireland, the localities are in Cambridgeshire, near Thetford in Norfolk, and near Brandon in Suffolk. (The scientific name is *Agrophila sulphuralis*.)



685. The Pale-shoulder (*Acontia albicollis*).

685. THE PALE-SHOULDER.—The palpi are porrected, approximate, small, and very inconspicuous, the terminal conical joints just appearing beneath the frontal tuft; the antennæ are simple: the fore wings are straight on the costa, and rounded at the tip, they are creamy-white at the base, and have a square creamy-white spot on the costa, rather beyond the middle; the basal white area has a black dot near the base of the wing, and a curved line above it, reminding one of an eye and eye-brow; the remainder of the wing is rich purple-brown, mottled and marbled with various shades and tints, and having three white crescents near the anal angle; the fringe is long, the apical half brown, the lower half white: the hind wings have the basal area brown, this colour projecting three differently-shaped lobes into the median area, which is creamy-white; the hind margin is occupied by a broad brown band, the fringe is long and white: the head, thorax, and body are white, the head and neck having the faintest tinge of brown.

According to M. Guenée, "The caterpillars of the genus Acontia possess but two pairs of claspers; they are very long and very slender, but rather incrassated towards the posterior extremity; they are smooth, but the dorsal dots or tubercles are very visible, and each is surmounted by a hair: they feed on low plants, and turn to chrysalids in small earthen cocoons."

The MOTH on the continent appears in July, flying in the sunshine. I possess one specimen supposed to be British, but know nothing of date or locality. (The scientific name is *Acontia albicollis*.)



686. The Four-spotted (*Dysthymia luctuosa*).

686. THE FOUR-SPOTTED.—The palpi are rather long and very slender, the terminal joint being very fine-pointed; the antennæ are simple in both sexes: the fore wings are broad and ample, the costal margin very straight; their colour is nearly black, but slightly marbled with other shades; the orbicular is not to be traced; the reniform, on the contrary, is very large and conspicuous, and it

is either chalky-white or rosy-red, and at its upper or costal extremity it actually touches the costa, and has, moreover, a little lobe each side of its costal extremity, which also touches the costa: the hind wings are black with a white median band, which is very various in size and form, and is sometimes interrupted in the middle; on the hind margin is a small white spot, and the fringe is white with a black spot in the middle.

The EGGS are laid in May, or early in June, on the climbing stems and flower-buds of the common bindweed, and the young caterpillars emerge in about ten or twelve days: the head is then much larger in proportion to the body than in more advanced life, but not so large as is generally the case in infant caterpillars: both the head and body are furnished with a considerable number of hairs, which are far more conspicuous at this early period than a week or ten days later: the body is of nearly equal substance throughout, and the sides are nearly parallel: they feed almost entirely by night, and principally on the unexpanded flower-buds of the bindweed, hiding themselves by day near the surface of the ground, and remaining motionless during daylight. The full-grown caterpillar rests in a perfectly straight position, so far as the sinuosities of the plant will allow, on the slender stems of the common field bindweed (*Convolvulus arvensis*), the legs holding the stem slightly, but the claspers being more firmly attached, except the anal pair, which are stretched out behind: when annoyed, it falls to the ground, rolled in a lax and imperfect ring, the head turned on one side: the head is exserted and porrected; it is of almost exactly the same width as the second segment, and emits a considerable number of straight hairs: the body is elongate and rather slender; it is attenuated towards the anal extremity; on the second segment is a glabrous shining plate of a semicircular figure, the convex side being posterior; the remaining segments are distinctly marked, and each is slightly swollen in the middle. The colour of the head is pale rather shining brown, with eight irregular longitudinal series of amorphous spots; the plate on the second segment is dingy brown, intersected by three paler stripes; the dorsal area of the body is striped with brown of two shades, there being three pale and four darker stripes; the paler stripes are medio-dorsal and lateral, the darker stripes alternating with them, and each darker stripe having in each segment a paler wart-like spot, which emits a hair; the lower dark stripe on each side is compound or composed of several minor stripes; the ventral is decidedly paler than the dorsal area, and the division between the two is abrupt and clearly defined; there is a medio-ventral series of black spots connected by a slender and indistinct stripe of the same colour; the black spots are most conspicuous on the fifth, sixth, seventh, and eighth segments: the legs are rather long, pale, semi-transparent brown, with black rings; the claspers are nearly concolorous with the ventral area. These caterpillars, which were full-fed on the 14th of June, went down to undergo pupation on or under the surface of the earth.

The MOTH appears on the wing in May, June, August, and September. It has been taken in the utmost profusion by Dr. Battersby, in Torquay, and subsequently by all collectors who have visited the locality; also near Exmouth by Dr. Jordan, in Hampshire, Isle of Wight, Brighton, and Lewes, in Sussex, and near Gravesend, in Kent. (The scientific name is *Dysthymia luctuosa.*)

Obs. 1.—The caterpillars of the genus *Acontia*, with which this species has usually been associated, have only six claspers, four of them ventral and two anal, whereas *Luctuosa* has invariably ten, eight of them ventral and two anal: this extraordinary discrepancy was pointed out by M. Guenée, who did not, however, consider it desirable to separate the species generically: I think I have no choice but to propose a new generic name for *Luctuosa.*

Obs. 2.—I am indebted to Mr. Vaughan for the loan of the beautiful variety represented in the lower figure.



687. The Rosy Marbled (*Erastria venustula*).

687. THE ROSY MARBLED.—The palpi are porrected, extending very considerably in front of the head ; the second joint is very sparingly clothed with scales, the terminal joint sharp-pointed and almost entirely naked; the antennæ are very slender and simple in both sexes ; the habit of the insect is that of a *Tortrix ;* the costal margin of the fore wings is curved, more especially at the base ; their colour is creamy-gray, with a delicate rosy tint on the basal portion of the costal area. I find no trace of the orbicular ; the reniform is present, its median area being light brown, and the circumscription of its minor lower border white ; a waved transverse white line crosses the wing beyond the reniform ; the hind margin has a broad and somewhat triangular brown blotch ; in the middle of the inner margin is another large and somewhat triangular brown blotch ; this latter is bordered with white and also intersected by a white line near its basal extremity : the hind wings are pale dingy brown : the head, collar, and disk of the thorax are brown, the sides and hind part of thorax almost white ; the body is gray.

The CATERPILLAR when annoyed falls from its food-plant, but does not roll itself in a ring or feign death, being apparently satisfied with the natural protection afforded by its colour, for it is almost impossible to distinguish it on the ground and among the grass : the head is narrower than the second segment, prone and shining : the body is smooth and velvety, the fourth and fifth segments considerably incrassated ; the segments exhibit a decided continuity, the interstices between them being difficult to perceive : the colour of both head and body is purplish-brown, with a paler medio-dorsal stripe, which is indistinct throughout, and nearly obliterated on the third and fourth segments, and there is a roundish spot of the same pale colour on each side of the fifth segment : it feeds on the yellow blossoms of the trailing tormentil (*Tormentilla reptans*), and when full-fed, about the end of August, it conceals itself at the roots of the plant, or the short grasses among which the plant grows in the sides of forest roads, and there spinning a slight cocoon changes to a smooth brown CHRYSALIS.

The MOTH appears on the wing at the end of June and during July. As far as regards Great Britain, it has only been found in Epping Forest, where it was discovered many years back by Mr. Doubleday. (The scientific name is *Erastria venustula.*)

Obs.—I think that neither Treitschke nor any subsequent author can have really been acquainted with the caterpillar of this species : my description is from the life, the specimens described having been kindly presented to me for that purpose by Mr. C. J. Biggs.



688. The Marbled White-spot (*Erastria fuscula*).

688. THE MARBLED WHITE-SPOT.—The palpi are porrected, rather long, very slender, and sharp-pointed ; the antennæ are slender and alike in both sexes : the fore wings are rather arched on the costal margin ; their colour is dark marbled bistre-brown ; the anal angle is occupied by a large white blotch, which is shaded with pale brown as it approaches the hind margin; the reniform and orbicular are distinctly outlined in white, the median area being brown ; the fringe is spotted : the hind wings are dingy gray-brown : the head and thorax are brown ; the body is gray-brown and crested, the crest on the fourth and fifth segments being prominent; all the crests are tipped with brown.

I have not seen the CATERPILLAR of *Erastria fuscula*, but M. Guenée describes it as of a yellowish-gray colour, with a broad brown continuous medio-dorsal stripe, a narrow black

and interrupted sub-dorsal stripe, and a spiracular stripe of the ground-colour between two shades of a brick-red colour ; the head is concolorous with the body, and has two black spots ; the legs are reddish : it feeds in August and September on different species of bramble (*Rubus fruticosus*, &c.).

The MOTH appears on the wing in June and July, and seems common in Cornwall and Devonshire, and also in Monk's Wood among brambles; it is occasionally found by Mr. Doubleday at Epping among brambles in dry situations. Mr. Birchall informs us of this species, also *Bankia argentula* and *Hydrelia unca*, that they occur in profusion at Killarney, in Ireland ; he says : "Any one who has traversed the bogs of the county Kerry in the early part of June, will not soon forget the astonishing numbers of these three insects, which rise around him as he pushes his way through the thick growth of sweet-gale (*Myrica gale*).



689. The Silver-barred (*Bankia argentula*).

689. THE SILVER-BARRED.—The palpi are porrected, rather long, very slender, and sharp-pointed ; the antennæ are slightly pubescent in both sexes : the fore wings are slightly arched on the costa, and sharply so at the base ; their colour is olive-green with two white bars ; the first commences near the middle of the inner margin, and ascends obliquely to the costal margin near its base, it then proceeds along the costa until it touches the thorax, and then curving downwards ceases on the inner margin near its base ; the second white bar commences near the anal angle and ascends obliquely to near the middle of the costal margin; just beyond its middle this bar projects a lobe towards the base of the wing ; there is an oblique white line near the tip of the wing, and a double whitish band on the hind margin : the hind wings are gray : the head is olive-green sprinkled with white scales ; the collar olive-green in front, white behind ; the body is gray and slightly crested, its shape is linear, and its extremity tufted in the male ; it is stouter, porrected, and pointed in the female.

The CATERPILLAR, according to Guenée, is green, the dorsal area and the incisions of the segments being a little darker ; there are two lateral stripes of a yellowish-white, both of them surmounted and bordered with dark green: the head and legs are also green : it feeds on grasses. The CHRYSALIS is short and enclosed in a small oval cocoon on the surface of the earth.

The MOTH appears on the wing in June, and has been taken in profusion at Killarney. Mr. Stainton also gives Beachamwell, in Norfolk, and Whittlesea Mere, in Cambridgeshire, as localities where it has occurred. (The scientific name is *Bankia argentula.*)



690. The Silver Hook (*Hydrelia unca*).

690. THE SILVER HOOK.—The palpi are porrected, slender, widely separated, and pointed ; the antennæ are short, slender, and very slightly pubescent in both sexes : the costal margin of the fore wings is straight ; there is a costal stripe of dove-colour, sometimes tinged with ochreous, and this is bordered below by another stripe almost white ; the disk of the wing is wood-brown, excepting the reniform, which is of the same white hue as the sub-marginal stripe, of which it seems to form an oblique projecting lobe ; the hind-marginal band is most delicately lined with different shades of brown, the extreme inner and extreme outer borders of this band being

pure white; the hind wings are dingy gray-brown: the head, thorax, and body are grayish dove-colour.

The CATERPILLAR, according to Treitschke, is very similar to that of *Bankia argentula;* it is slender and of a green colour, with a white lateral stripe.

The MOTH appears on the wing in June; it is common in Cornwall, and Mr. Reading says: "It is most plentiful on Dartmoor, in Devonshire, but the nature of the place precludes one from obtaining it easily;" it has also been taken in Somersetshire, Suffolk, Norfolk, Cambridgeshire, Yorkshire, and the Lake District: it absolutely swarms in the neighbourhood of Killarney, in Ireland, but I think has not occurred in Scotland. (The scientific name is *Hydrelia unca.*)



691. The Purple Marbled (*Micra ostrina*).

691. THE PURPLE MARBLED.—The palpi are porrected, ascending, and curved, the terminal joint being slender, distinct, and pointed; the antennæ have a very short and fine pubescence in the male, in the female they are quite simple; the fore wings are nearly straight on the costa and pointed at the tip; their colour is nearly white; there is an oblique median orange band, and beyond this an oblique and rather wide hind-marginal band generally intersected by a waved white line; the fringe is pale brown: the hind wings are rather small and almost white, with two or three pale brown transverse bars; the fringe is almost white: the head and thorax have the mixed colours of the fore wings; the body is almost white.

The CATERPILLARS of the genus *Micra* have only six claspers; they have a small head and a rather stout body, attenuated at both extremities; they are supposed to feed on the stems of low-growing plants, especially towards the ends; the CHRYSALIDS are short with prominent segments, and are enclosed in lax oval cocoons spun among the leaves of the food-plant.

The MOTH appears on the wing in June, and has been taken in one English and one Welsh county only, Devonshire and Glamorganshire. Mr. Reading records the capture of a specimen at Torquay, by Miss Battersby, and Mr. Stainton says one specimen was taken at Bideford, in June, 1825. The Welsh locality is thus recorded in the *Entomologists' Monthly Magazine* by Mr. Llewelyn: "It was in the month of July, a few years since, that I captured, on the sand-hills at Pembrey, South Wales, a pretty little insect whose identity I have, until lately, been utterly unable to establish. The spot at which I secured it was rather barren and sandy, in a sheltered situation; an abundance of dwarf sallow grew in the vicinity, and also, as far as I remember, thistles, bed-straw, wild thyme, and a short kind of grass, from which latter I expect that I disturbed it; at any rate, the insect was flying low over the barren sand when I caught it. The day was showery, with occasional gleams of sunshine, during which *H. Semele* and other butterflies were on the wing, and during one of these gleams I took the insect, and seeing that it was something I did not know, boxed and pinned it at once. The recollection of the capture is very fresh in my mind, owing to the pleasure of the expedition and the difficulty I have had in getting the insect named." (The scientific name is *Micra ostrina.*)

Obs. 1.—The figure is from a specimen kindly lent me by Mr. Bond.

Obs. 2.—My knowledge of this genus and the two supposed species is very slender and derived almost exclusively from books.



692. The Small Marbled (*Micra parva*).

692. THE SMALL MARBLED.—The palpi are porrected, ascending, and curved; the terminal joint is distinct and pointed; the antennæ are

simple: the fore wings are nearly straight on the costa and pointed at the tip; their colour is almost white, with a median oblique pale brown band which is exteriorly bordered with white, and a broad hind-marginal band of the same pale hue, and intersected throughout by a narrow waved white line; there is a black dot just within this white line near its costal extremity, and a second near the apical angle; the fringe is delicately pale brown: the hind wings are white, slightly cloudy at the base, and have a pale brown hind margin: the palpi, head, thorax, and body are almost white.

The CATERPILLAR is said by Stainton to feed on the stems of thistle.

The MOTH appears on the wing in June: it was first taken in England, says Mr. Reading, at Teignmouth, in Devonshire, by Dr. Jordan, who secured a specimen when flying about a lamp. In 1858 Dr. Battersby found a good habitat for this species at Torquay, where he obtained examples. (The scientific name is *Micra parva*.)

Obs. 1.—The figure is from a specimen kindly lent me by Mr. Bond.

Obs. 2.—The following paragraph is copied from the *Entomologists' Annual* for 1859. It is written by Dr. Battersby, of Torquay: "My daughter having found a specimen of *Micra ostrina* in June, I was induced to go with my children the two following mornings and make a close search along the coast wherever the cliffs are accessible, and having a good many little eyes at work we were fortunate enough to meet with five more; they occurred at three places in an extent of about three miles, and were met with half-way down the cliffs to the water's edge. We found *Micra parva* only in one place, and saw but two specimens, both of which were captured; they as well as *Ostrina* lay very close among the grass and brambles, and when disturbed did not fly more than a yard or two, *Ostrina* settling on the ground, and *Parva* on plants: this was the only difference I observed in their habits; indeed, until I was able to examine both carefully at home, I considered that I had merely taken the two sexes of *Ostrina*. We searched the cliffs with great care for nearly a week afterwards, but without seeing a trace of more." From the figure which accompanies the notice in the *Annual*, I should have supposed this insect to be the female of *Ostrina*. I observe that M. Guenée regards *Micra parva* as a distinct species, but whether Dr. Battersby's insect belongs to that species or not, we have no evidence. I incline to refer both insects to the *Phytometra minuta* of Haworth, p. 265, No. 30.



693. The Orange Underwing (*Brephos Parthenias*).

693. THE ORANGE UNDERWING.—The palpi are concealed in a beak-like tuft of hairy scales; the antennæ of the male are thickened and serrated, not pectinated: the wings are ample, the costal margin of the fore wings being straight almost to the tip, and then slightly curved; their colour is reddish-brown, thickly sprinkled with paler scales; about the middle of the costa there is a more or less conspicuous pale blotch, which serves as the commencement of a very indistinct transverse pale median bar; this bar generally includes the reniform; half-way between the bar and the base of the wing are two pale marks on the costa: the hind wings are deep rich orange with a large smoky-gray patch occupying the inner margin, and projecting a sharp angle into the very middle of the wing, where it joins the dark discoidal spot: the head, thorax, and body are black-brown and very slender.

The CATERPILLAR has a smooth semi-porrected head, scarcely narrower than the segment

segment; the body is slightly hairy, rather slender, and has the back always arched in crawling, after the manner of a Geometer; although it has eight ventral claspers, it never uses the two anterior pairs for prehension; when annoyed it does not feign death or roll in a ring, but falls from its food-plant and hangs by a thread: the colour of the head is apple-green, of the body green, with a double white or whitish-yellow medio-dorsal stripe, and a lateral stripe of the same colour; there is also a more conspicuous yellowish stripe below the spiracles, which are black; between the stripes there are two white dots on each segment. It feeds on birch (*Betula alba*), and when full-fed descends to the ground, and spinning a slight cocoon either in crevices of the birch-bark or on the ground, changes to a smooth brown CHRYSALIS.

The MOTH appears on the wing with the first bright sunny days of March, flying in the sunshine, and has been taken in Sussex, Surrey, Kent, Essex, Suffolk, Gloucestershire, Herefordshire, Shropshire, Derbyshire, Yorkshire, in the Lake District, and also in Scotland, but I think not in Ireland. (The scientific name is *Brephos Parthenias.*)



694. The Light Orange Underwing (*Brephos notha*).

694. THE LIGHT ORANGE UNDERWING.—The palpi are concealed in a beak-like tuft of bristly scales; the antennæ of the male are distinctly pectinated, those of the female simple: all the wings are ample, the costal margin of the fore wings is nearly straight, being slightly curved only at the tip; their colour is grayish-brown, with an indistinct paler blotch near the middle of the costal margin, and the entire surface is sprinkled with paler scales: the hind wings are deep rich orange, with a large smoke-coloured blotch on the inner margin, an angle or lobe of which is prolonged into the very middle of the wing, where it joins a discoidal spot of the same colour; the hind margin is also smoke-coloured: the head, thorax, and body are black-brown and very slender.

The CATERPILLAR has a smooth semi-porrected head, almost triangular in shape, and rather narrower than the second segment; the body is rather slender, and always arched in crawling, after the manner of a Geometer, and although it has eight ventral claspers, like the caterpillars of true *Noctuæ*, it never uses the two anterior pairs for prehension. When annoyed it does not feign death or roll in a ring, but drops from its food-plant, suspended by a thread; the colour of the head is smoky brown, with a darker patch in the middle of each cheek; the body is dull apple-green with four brown spots on the back of the second segment, and a narrow continuous medio-dorsal stripe rather darker than the ground-colour, and rendered more conspicuous by being bordered with very pale green; on each side, in the region of the spiracles, is a broader continuous stripe, almost black; the belly and claspers are green; the legs tinged with brown. It feeds on aspen (*Populus tremula*). The CHRYSALIS is reddish-brown, smooth and shining.

The MOTH appears on the wing in March and April: it has been taken in Sussex, Surrey, Kent, Essex, Berkshire, Suffolk, Gloucestershire, Worcestershire, Shropshire, and Yorkshire. (The scientific name is *Brephos notha.*)



695. The Light Spectacle (*Abrostola Urticæ*).

695. THE LIGHT SPECTACLE.—The palpi are long and slender, not directly porrected, but obliquely ascending, the second joint is bent,

the terminal straight; the scales on both are short, so much so on the terminal joint as to make it appear almost naked; the antennæ are delicately pubescent but otherwise simple in both sexes: the fore wings are straight along the costa until near the tip, when they are slightly curved and pointed; their colour is inclined to gray both at the base and hind margin, the median area being brown, and being also bounded on both sides by a double transverse line; the discoidal spots are imperfectly outlined in brown, the orbicular is the larger of the two, oblique and reniform; the tip of the wing is dark brown: the hind wings are glossy black-brown, rather paler at the base: the head, thorax, and body are gray brown; the thorax and body are crested.

The CATERPILLAR never rolls in a ring, but sometimes feigns death and falls off its food-plant when disturbed, assuming a bent posture: it is slender at the anterior extremity —the second, third, and fourth segments being particularly attenuated and stretched out leech-like in crawling; the fifth, sixth, and seventh segments are tumid on the back, but scarcely humped; the eight, ninth, and tenth segments are rather tumid and very convex on the back; the twelfth segment is humped, and terminates in two sharp short distant points directed backwards; between this bifid hump and the thirteenth segment the body is slightly concave, and the hind claspers are passed under the body in crawling; the prevailing colour is clear pale green, mixed with white-green on the back, and not varied with brown; the clear green forms an interrupted median stripe of shuttle-shaped markings down the back, one on each segment; also, two oblique marks of the same green on each segment, distant in front but approximate behind, and forming something like V-shaped markings pointing backwards; there is a narrow white stripe along the middle of each side on the fifth, sixth, and seventh segments; this is connected by a very distinct white line with the white on the back: it feeds on the stinging-nettle (*Urtica dioica*), and is full-fed in September, when it spins up amongst the leaves.

The MOTH appears on the wing twice in the year, in June and August, and occurs in all our English, Scotch, and Irish counties so far as they have been investigated by entomologists. (The scientific name is *Abrostola Urticæ*.)



696. The Dark Spectacle (*Abrostola triplasia*).

696. THE DARK SPECTACLE.—The palpi are long and slender, not directly porrected, but obliquely ascending: the second joint is bent, the terminal joint straight, the scales on both are short, so much so on the terminal joint as to make it appear almost naked; the antennæ are delicately pubescent, otherwise simple in both sexes: the fore wings are straight along the costa, where they are slightly curved and pointed, their hind margin is waved; their colour is chocolate-brown, the general area of the wing is divided into three compartments by two compound transverse lines; the median area is almost uniformly brown and contains indications of the usual discoidal spots; the basal area is paler, being tinged with ochreous; the apical area has a blackish cloud near the tip, and an ochreous blotch near the anal angle; a pale zigzag transverse line, parallel with the hind margin, passing through both of these: the hind wings are dark smoky-brown, paler at the base; the outer portion of the fringe is silvery-brown: the head, thorax, and body are brown, the thorax and body crested.

The CATERPILLAR never rolls in a ring, but feigns death when disturbed, and falls to the ground, assuming somewhat the figure of a pot-hook, or letter S. The body is attenuated in front, the second, third, and fourth segments being elongated and stretched out leech-like in crawling; the fifth and sixth segments are humped and elevated in crawling; the claspers are ten in number, the anterior pair, those on the seventh segment, being generally

held clear of the ground in crawling; the twelfth segment is humped, and the hump is concave, culminating in two lateral points; the outline of the caterpillar from this last hump descends perpendicularly to the anal pair of claspers, and these evidently pass under the body whenever moved forward in walking. The prevailing colour is olive-green or dingy brown, very variable; the second, third, and fourth segments being deeper olive-brown, with a whitish central dorsal stripe, and generally also a short lateral stripe of the same pale hue; the fifth and sixth segments have each a dark velvety patch on the middle of the back, which I have already described as humped; on the fifth segment this patch is triangular, the apex of the triangle being anterior, and the triangle surrounded by a whitish margin; the patch on the sixth segment is rounded before and behind, and there margined with white, but open and not distinctly margined on the sides; the twelfth segment has a transversely oblong dark velvet patch, surrounded with a white line; on all the segments, from the fifth to the twelfth inclusive, is a rather indistinct and narrow white stripe just above the spiracles, which are also white; above this lateral stripe is an oblique line of the same colour on each segment. It feeds on the stinging-nettle (*Urtica dioica*) and hop (*Humulus lupulinus*), and is full-fed about the end of September, when it spins up amongst the leaves.

The MOTH appears on the wing twice in the year, in June and August, and seems to have been found in England, Scotland, and Ireland, wherever investigated by entomologists. (The scientific name is *Abrostola triplasia*.)



697. The Scarce Burnished Brass (*Plusia orichalcea*).

697. THE SCARCE BURNISHED BRASS.—The palpi are curved upwards in front of the frontal tuft; the second joint is scaly, the terminal joint long, slender, pointed, and almost naked; the antennæ are simple: the fore wings are nearly straight on the costa, and slightly bent and pointed at the tip; their colour is umber-brown, suffused in recent specimens with a purple glow; they are transversed by two transverse lines, the outer of which divides a large gold coloured metallic blotch, which is situated near the apical angle: the hind wings are gray-brown: the head, thorax, and body are brown: the body crested.

The CATERPILLAR is green, the medio-dorsal line white, edged with a wavy streak, the spiracular stripe broad and white, edged above with dark green; spots white (*Treitschke*). It feeds on hemp-agrimony (*Eupatorium cannabinum*).—(*Stainton's Manual*, vol. i. p. 306).

The MOTH appears on the wing in August, and is always regarded as a great rarity by entomologists: Mr. Reading informs us it has been taken by Mr. E. Lethbridge, near Plymbridge, and under the Hoe, at Plymouth; the specimens were flying from flower to flower in open daylight; Mr. Dale has taken it in Dorsetshire; Mr. Harding, near Deal, in Kent; and Mr. Jenner Fust reports it for his thirteenth subprovince, which includes Gloucestershire and Monmouthshire. (The scientific name is *Plusia orichalcea*.)

Obs.—I do not possess a specimen of this beautiful moth, and have to acknowledge my obligation to Mr. Bond for his kindness in lending me one to figure and describe.



698. The Burnished Brass (*Plusia chrysitis*).

698. THE BURNISHED BRASS.—The palpi are curved upwards in front of the frontal tuft, the second joint is scaly; the terminal

joint long, slender, and naked; the antennæ are simple: the fore wings are very straight in the costa, but decidedly curved, indeed slightly hooked, and sharply pointed at the tip; their colour is metallic golden-green, with a brown blotch at the base, another and larger brown blotch at the middle of the costal margin, and a third opposite this on the inner margin; in some of my specimens the costal and inner-marginal blotches unite in forming a median band; the hind margin itself is occupied by a semi-metallic band much less bright than the other metallic portions of the wings: the hind wings, head, thorax, and body are gray-brown.

The CATERPILLAR rests in a bent posture on the leaves or stems of its food-plant, the anterior extremity being held up and not touching the food-plant, to which the attachment is by the claspers only; these are six in number, four ventral and two anal; the head is small and shining, the face rather flat; the body is attenuated at the anterior extremity, and stretched out leech-like; it gradually increases in size to the twelfth segment, which is swollen and rather humped; the colour of the head and body is apple-green without stripes, but having a dorsal ornamentation on each segment consisting of six white marks; the two of these nearest the middle are V-shaped, the angles of the V's pointing backwards; the others, two on each side, are linear and slightly oblique; on the second, third, and thirteenth segments the V's are wanting, the lines only being present; there is a very slender lateral stripe also white, and immediately below this are the spiracles, visible only from their black circumscription; beneath the spiracles is a series of white dots. It feeds on the white dead-nettle (*Lamium album*), burdock (*Arctium Lappa*), stinging-nettle, (*Urtica dioica*), and a number of other low plants, and is full-fed in June, when it spins a whitish cocoon among the leaves of its food-plant, and therein changes to a black CHRYSALIS with a pointed horn at its anal extremity.

The MOTH appears on the wing twice in the year, in June and August, and is of frequent occurrence in our English, Scotch, and Irish counties. (The scientific name is *Plusia chrysitis.*)



699. The Gold Spangle (*Plusia bractea*).

699. THE GOLD SPANGLE.—The palpi are curved upwards, the second joint being long and slender and standing quite upright; the antennæ are simple: the fore wings are nearly straight on the costa, and scarcely bent at the tip; their colour is rich umber-brown below the median blotch, which is of a most brilliant metallic gold-colour; the shape of this blotch will be best seen by a reference to the figure: the hind wings are gray-brown towards the margin and paler at the base, and the wing-rays are darker in this pale portion: the palpi and front of the thorax are reddish-brown; the crown of the head and disk of the thorax are umber-brown; the body is pale gray, brown towards the base, red-brown towards the tip; the back is crested, the crest on the fourth segment being the most conspicuous and very dark brown.

The CATERPILLAR has a small flat and porrected head, much narrower than the second segment; the body has the segmental divisions very clearly marked; the anterior ones are rather small, but those which follow are stouter, and the posterior ones, from the ninth to the twelfth, are very stout and tumid; the entire surface of the body is covered with fine scattered hairs; there are but six claspers, two each on the ninth, tenth, and thirteenth segments: the head is pale green, with a narrow brown line on each side: the body is apple-green, with a narrow medio-dorsal white line; and a narrow lateral white line on each side. It feeds on the hemp-agrimony (*Eupatorium cannabinum*) and, spinning a rather loose cocoon near the roots of the plant, therein

changes to a CHRYSALIS. I am indebted to my kind friend, Mr. Doubleday, for drawings of the caterpillar.

The MOTH appears on the wing in July, and has been taken in Worcestershire, Shropshire, Cheshire, Yorkshire, and Scotland. Mr. Birchall took it in the county Wicklow in Ireland. (The scientific name is *Plusia bractea.*)



700. The Gold Spot (*Plusia Festucæ*).

700. THE GOLD SPOT.—The palpi are compressed, porrected and ascending; the long scales of the second joint projecting in front; the terminal joint is erect and pointed; the antennæ are simple: the fore wings are nearly straight on the costal margin and scarcely at all bent towards the tip; their colour is brown, washed here and there with gold, more particularly at the base of the costal margin, near the apical end of the same, along the hind margin, especially toward its anal angle, and on the inner margin near its base; there are also three metallic spots, the colour of which is somewhat between the white of silver and the yellow of gold; their brightness is intense; two of these are obscurely pear-shaped, and placed lengthwise in the middle of the wing; the third is nearer the apical angle and adjoins the golden wash at the apical extremity of the costa: the hind wings are gray-brown; all the fringes are pale rosy-brown; the antennæ, head, palpi, and thorax are reddish-brown; the body gray-brown tipped with reddish-brown.

The CATERPILLAR has rather a small head, narrower than the second segment and slightly porrected; the body is cylindrical and rather stout, it is sparingly covered with short fine hairs; it has but four ventral claspers, and arches its back in crawling after the manner of Geometers: the colour of both head and body is bottle-green, with six narrow and equidistant white stripes on the back, and a rather broader stripe on each side in the region of the spiracles, bright yellow: it feeds on several grasses in May and June, and is full-fed the beginning of August, when it spins a whitish cocoon among the leaves of grasses and changes to a green CHRYSALIS.

The MOTH appears on the wing in August, and is generally distributed in our English counties, commencing with Cornwall and Devonshire and reaching not only Yorkshire but entering Scotland. Mr. Birchall says it is common and widely distributed in Ireland. (The scientific name is *Plusia Festucæ.*)



701. The Plain Golden Y (*Plusia Iota*).

701. THE PLAIN GOLDEN Y.—The palpi are porrected, ascending, and, except the terminal joint, which is erect and pointed, they are completely muffled in scales; the antennæ are simple: the fore wings are straight on the costal margin, slightly bent towards the pointed tip, and somewhat produced at the anal angle of the inner margin; their colour is umber-brown, washed with rosy-brown, except as regards a large lozenge-shaped blotch, which occupies the middle of the inner margin, and ascends to the middle of the wing; this blotch contains two bright marks of burnished gold, the lower and smaller of these is round, the upper is V-shaped: in one of my specimens these are united; the brown tints of the wing are softly blended together, and not sharply divided: the hind wings are gray-brown, paler at the base and having the wing-rays in the paler area decidedly darker; all the fringes are rosy-brown, indistinctly alternated with umber-brown: the head, thorax, and body are rosy-brown; the body is crested and the third

crest is very prominent, and tipped with darker brown.

The CATERPILLAR rests in a bent position, the anterior extremity being elevated and held away from its food-plant; it has but six claspers; the head is small, shining, and porrected; the anterior part of the body is slender and stretched out leech-like in crawling, when the back is arched after the manner of a Geometer; the body increases in thickness to the twelfth segment, which is swollen and rather humped; the colour of both the head and body is apple-green; there are three slender white lines on each side of the medio-dorsal vessel, which is scarcely visible; and on each side just above the spiracles is a slender yellow line perfectly continuous from the mouth to the anal claspers, this is bordered above by a darker stripe also very slender; this dark or black border is sometimes interrupted, and sometimes almost absent; on each side of this side-stripe is a series of white dots, generally three on the dorsal surface of each segment, and four below the stripe; the spiracles are whitish and scarcely perceptible: it feeds on the white dead-nettle (*Lamium album*), the stinging nettle (*Urtica dioica*), and other low plants, and is full-fed at the beginning of June, when it spins a whitish cocoon among the leaves of its food-plant and in this changes to a black CHRYSALIS, which has the incisions of the ventral segments greenish-brown, and the wing-case is prolonged beneath the segments of the body; the body terminates in a small black knob, which is rather prominent and furnished with six short spines placed side by side; the two middle ones are longer than the rest, placed close together and bent in the form of a hook; the spiracles are reddish.

The MOTH appears on the wing in June and July, more plentifuly in the latter; it occurs in all our English and Scotch counties, and Mr. Birchall says it is common and widely distributed in Ireland. (The scientific name is *Plusia Iota.*)

Obs.—My knowledge of the caterpillar and chrysalis is derived from the "*Collection des Chenilles.*"



702. The Beautiful Golden Y (*Plusia pulchrina*).

702. THE BEAUTIFUL GOLDEN Y.—The palpi are porrected and ascending, and, excepting the terminal joint, which is erect and pointed, they are completely muffled in scales; the antennæ are simple; the fore wings are straight on the costal margin, and slightly bent towards the pointed tip; their colour is rosy-brown, blotched and variegated with dark rich umber-brown; there is a large lozenge-shaped blotch near the middle of the inner margin, which contains two bright marks of burnished gold; the lower and smaller of these is round, the upper somewhat V-shaped, and emitting a thread-like line of glittering scales, which meanders nearly to the base of the inner margin; both the discoidal spots are perceptible, and are always either partially or entirely circumscribed with a thread-like boundary of metallic scales: the hind wings are gray-brown, paler towards the base, the paler area having a darker median bar, wing-rays, and discoidal spot; the fringe of all the wings is rosy-brown, alternating with darker brown; the head and thorax are varied with the two shades of brown; the body is gray-brown, redder towards the extremity: its back is crested, the crests being darker.

The MOTH appears on the wing in July, and has been taken in most of our English and Scotch counties, and Mr. Birchall informs us it is widely distributed and common in Ireland. (The scientific name is *Plusia pulchrina.*)

Obs.—Contrasted with the preceding species, *Pulchrina* is more decidedly variegated than *Iota*; the boundaries of the shades being more sharply defined.



703. The Silver Y (*Plusia Gamma*).

703. THE SILVER Y.—The palpi are porrected and ascending, the second joint very scaly, the terminal joint slender and erect; the antennæ are simple: the costal margin of the fore wings is straight nearly to the tip, where it is very slightly hooked and pointed; their colour is glittering-gray, mottled and marbled with sepia-brown; the darker colour forms a large lozenge-shaped patch between two pale transverse lines, and occupying the middle of the inner margin; in this patch is a bright silvery mark, supposed to represent the Greek gamma γ and the English *y*, as written: the hind wings are pale at the base, with dark wing-rays, there is a broad black hind-marginal band; the fringe of all the wings is gray interrupted with smoky-brown: the head, thorax, and body are gray-brown, the last crested.

The CATERPILLAR rests in a bent posture, the back slightly arched: the head is small and porrected in crawling, the body having the action characteristic of a Geometer; the anterior extremity is attenuated, and the remainder of the body gradually increases in thickness to the twelfth segment, which is thickened and slightly humped; every part emits short bristle-like hairs; like its congener it has four ventral and two anal claspers; the colour of both head and body is apple-green, or glaucous-green, with six very narrow and rather inconspicuous white stripes; in the region of the spiracles is a yellow stripe, almost as slender as the six dorsal stripes, but more conspicuous, inasmuch as it has a decidedly yellow tint; closely approximate to this last are the spiracles of a whitish-green colour, and very inconspicuous; the legs are reddish-brown, the claspers green: it feeds on all kinds of garden herbs and low plants; I find it every year on a hop (*Humulus lupulus*) in my own garden; when full-fed it spins a whitish cocoon among the leaves of its food-plant, and in this it changes to a black shining CHRYSALIS.

The MOTH appears on the wing throughout the summer and autumn, flying about flowers morning, noon, and night; it comes freely to light, and is equally attracted by sugar: throughout Great Britain and Ireland it seems ubiquitous. (The scientific name is *Plusia Gamma*.)



704. The Ni Moth (*Plusia Ni*).

704. THE NI MOTH.—The palpi are porrected, but scarcely ascending, the second joint is scaly, but not densely so; the terminal joint slender and pointed; the antennæ are simple: the costal margin of the fore wings is straight nearly to the tip, when it is slightly bent and somewhat pointed; their colour is gray, mottled and marbled with sepia-brown; this darker colour occupying the median area of the wing, and containing a dull silvery mark supposed to bear a resemblance to the Greek γ or English *y*: the hind wings are gray-brown, rather paler at the base, where they have darker wing-rays: the head, thorax, and body are gray-brown, the latter with long reddish scales at the sides near the tip.

The MOTH is an inhabitant of North America, Italy, Sicily, and the South of France; it appears on the wing in June and August. A single specimen is said to have been taken at Alphington, near Exeter, by Mr. D'Orville, on the 13th of August, 1868, flying over the flowers of red valerian. I make use of the qualified term "is said," because the details given by Dr. Knaggs, in the *Entomologists' Monthly Magazine*, vol. v., p. 127, and in the

Annual for 1868, p. 125, do not agree with the authentic examples of the species from the continent of Europe kindly given me by Mr. Doubleday and described above. (The scientific name is *Plusia Ni.*)



705. The Scarce Silver Y (*Plusia interrogationis*).

705. THE SCARCE SILVER Y.—The palpi are porrected and ascending, the second joint very scaly, the terminal joint slender, short, and erect; the antennæ are simple: the costal margin of the fore wings is straight nearly to the tip, then slightly bent and slightly pointed; their colour is gray of various shades, beautifully mottled and marbled, and having a rich purplish-sepia tint; in the middle of the wing is a silvery mark which has been variously described, sometimes compared to a note of interrogation; its shape is inconstant, but its more ordinary appearance is represented in the engraving; the fringe is gray spotted with sepia-brown; the hind wings are dark sepia-brown with a pale median band and darker wing-rays; the fringe is gray spotted with brown: the head and thorax are mottled like the fore wings, the body is gray-brown.

CATERPILLAR green with white marking (*Treitschke*). It feeds on stinging-nettles (*Urtica dioica*). (*Stainton's Manual*, vol. i., 308.)

The MOTH appears on the wing in June, and has been taken by Lieut. Reed at Torquay, and Mr. J. S. Dell near Cann Quarry, Bickleigh Vale; these two captures, recorded by Mr. Reading, are the only ones I have heard of in the south of England, but other records exist of its occurrence at Llangollen in Wales, at Shrewsbury, in Derbyshire, Cheshire, Yorkshire, Lancashire, Westmoreland, and the Highlands of Scotland. It has not yet been recorded as occurring in Ireland. (The scientific name is *Plusia interrogationis.*)



706. The Herald (*Gonoptera Libatrix*).

706. THE HERALD.—The palpi are porrected and obliquely ascending; the second joint is long and densely clothed with scales, the terminal joint long and slender; the antennæ are serrated; the fore wings are nearly straight on the costa, hooked and pointed at the tip, and strongly toothed on the hind margin; their colour is gray, thickly freckled with minute transverse brown streaks, a little darker than the ground colour; the median and basal areas are tinged with rufous-orange; there is a white dot at the middle of the base, and an indistinct transverse gray line before the orbicular, which is represented by a small white spot; the reniform is not perceptible; but beyond the situation it usually occupies, is an oblique double gray line; a third gray line descends from near the tip, and is lost in the hind-marginal area: the hind wings are gray-brown: the head and thorax are tinged with reddish-brown, the body is gray-brown and flattened.

The CATERPILLAR rests in a nearly straight position on its food-plant; the head is smooth, obviously narrower than the second segment; the body is long, slender, and slightly attenuated towards both extremities; it is smooth and velvety, both in appearance and to the touch; the claspers are ten, but I have observed that the first ventral pair are rarely used in crawling; the anal pair are rather widely separated and are stretched out behind; the colour of the head is pale apple-green, of the body apple-green, with a narrow mediodorsal stripe, slightly darker, but very indistinct; the ventral area is glaucous-green, but the division between the dorsal and ventral areas is neither abrupt nor decided; there is a whitish and narrow lateral stripe, which, however, seems rather to form part of

the dorsal area, than to divide the dorsal from the ventral; the legs and claspers are glaucous-green; the spiracles are yellowish. It feeds on the sallow (*Salix caprea*), and when full-fed, which is towards the end of June, it binds together the leaves at the end of one of the twigs, and within the domicile thus formed it spins a beautifully white, oval cocoon, in which it turns to a black CHRYSALIS, which has a sharp-pointed extremity furnished with hooks.

The MOTH appears on the wing in August and September, but is very fond of hybernating in the perfect state almost as soon as it has left the chrysalis: common as it appears to be throughout the kingdom, I have only found it in stables, outhouses, and the dwellings of man; I have seen more than a dozen in a thatched tool-house that was kept locked, and into which they must have entered through a small square aperture left for the admission of light, and always closed unless when the tools were required; and they seemed to remain quite stationary all the winter, each keeping to the site it had originally selected. (The scientific name is *Gonoptera Libatrix*.)



707. The Copper Underwing (*Amphipyra pyramidea*).

707. THE COPPER UNDERWING.—The palpi are rather long, and ascend in front of the frontal tuft; the second joint is somewhat club-shaped, slender at the base, and gradually thickened towards the tip; they are scaly, but the scales lie flat and are closely appressed; the terminal joint is rather long, naked and pointed, and the points incline towards each other, sometimes even meeting; the antennæ are simple: the fore wings are broad, slightly arched on the costal margin, rounded at the tip, and slightly scalloped on the hind margin, their colour is brown; the orbicular is a mere black dot in a pale ring, the reniform is indistinguishable; there is an imperfect pale zigzag line between the base and the orbicular, and a more distinct zigzag line beyond the orbicular, followed by a suffused pale bar and two transverse series of white dots of diverse forms: the hind wings are dull orange-brown towards the costal margin: the head, body and thorax are gray-brown.

The CATERPILLAR rests in nearly a straight position; it does not fall from its food-plant if annoyed, unless compelled to do so, and it never rolls in a ring. It is stout, obese, of nearly uniform width throughout; the second, third and fourth segments, however, are rather more slender, and the twelfth rises in a pyramidal form, and is surmounted with a medio-dorsal horn-like point which is slightly curved backwards. The colour of the head is apple-green; the body in some examples apple-green, in others glaucous-green: in all there is a narrow medio-dorsal stripe extending from the head to the anal flap, and interrupted only by the horn-like summit of the twelfth segment, which is red: a lateral stripe passes along each side, just below the spiracles, from the head to the extremity of the anal flap, the spiracles themselves being white and surrounded by a black ring on each side; exactly intermediate between the medio-dorsal and lateral stripe is a waved and much interrupted stripe which originates immediately behind the head, and, after pursuing its sinuous course along eleven segments, ascends to the summit of the pyramidal protuberance on the twelfth, and again descends in a curve, vanishing in the anal flap; looking down on the summit of the pyramidal protuberance, six stripes seem to radiate from it in as many different directions: besides these stripes there are several dots on every segment, excepting the second; on the third and fourth segments these dots are eight in number, and arranged in a transverse dorsal series; on the following segments there are generally three of these dots between the medio-dorsal stripe and the interrupted stripe, and one between the interrupted stripe and the lateral stripe: the whole of these stripes and dots are of a

yellowish-white colour and are very distinct; each dot emits a minute and delicate hair from its centre; the legs are green, spotted with black, the black preponderating; the ventral surface and claspers are apple-green. It feeds on oak (*Quercus Robur*) and other trees, and is full-fed about the 1st of June, and then changes to a CHRYSALIS in a cocoon on the surface of the earth.

The MOTH appears on the wing in August, and comes freely to sugar in our southern and midland counties, extending, but less commonly, as far north as Yorkshire. Mr. Birchall says it is common at Killarney in Ireland. (The scientific name is *Amphipyra pyramidea.*)



708. The Muse (*Amphipyra Tragopogonis*).

708. THE MOUSE.—The palpi are rather long, and ascend in front of the frontal tuft; the second joint is rather club-shaped, the scales being closely appressed and lying very smooth; the terminal joint is naked and pointed, the two points approaching and nearly meeting. The antennæ are simple, the fore-wings are slightly arched on the costa and rounded at the tip; their colour is dull brown but shining; the orbicular is simply a black dot; the reniform two black dots placed one above the other as in the printed colon: the hind wings are gray-brown rather paler at the base: the head and thorax are dull brown; the body gray-brown.

The CATERPILLAR rests with its back slightly curved, the extremities being somewhat elevated, but not so conspicuously as in the Cuspidates: the head is narrower than the second segment, into which it is partially received: the body is smooth and velvety, almost uniformly cylindrical, but with the twelfth segment dorsally raised into an angular protuberance. The colour of the head and body in some specimens I examined was glaucous-green, in others apple-green; in the glaucous specimens there were two narrow and rather distant white stripes, which commenced very faintly on the second segment, and ascended making an obtuse angle on the twelfth and vanished on the thirteenth, in the apple-green specimens these stripes were pale yellow; in both there was a lateral stripe, equally narrow, just below the spiracles; this also was white in the glaucous specimen, yellow in the apple-green ones; it commenced on the second segment, and was continued the entire length of the caterpillar and round its anal flap; this side-stripe is margined above with black, the black being sometimes interrupted, but generally running from spiracle to spiracle, and surrounding each with a narrow black ring; the spiracles are oblong and pure white: scattered over the body are a few short and very slender bristles, only visible under a lens of moderate power: the legs are yellowish green: the claspers concolorous with the body. They were full-fed on the 24th of May. My specimens fed on the white thorn (*Cratægus oxyacantha*), but in gardens the caterpillars are very partial to larkspurs: they retired just beneath the surface of the earth on the 25th, and there changed to smooth CHRYSALIDS, without spinning any web or cocoon.

The MOTH appears on the wing in July and August, and is common and generally distributed in England, Scotland and Ireland. (The scientific name is *Amphipyra Tragopogonis.*)



709. The Gothic (*Nœnia typica*).

709. THE GOTHIC.—The palpi are porrected and ascending, the second joint flattened and very scaly, the scales forming a projecting lobe in front, beneath the terminal joint, which is

rather long, slender, naked, and ascending; the antennæ are simple: the fore wings are ample, the costa very slightly arched, and the tip scarcely pointed; their colour is marbled with darker brown, and ornamented with light brown; the orbicular and reniform are distinct; their circumscription is pale brown; the wing-rays are pale brown; and there are three transverse pale brown lines; the first is rather oblique, and situated before the orbicular, it has dark edges; the second is bent and is situated beyond the orbicular; it consists of eight or nine double crescents, each of which is bordered by a dark crescent of similar size and shape; the cusps of all these crescents point towards the hind margin; the third transverse line is parallel with the hind margin: the hind wings are gray-brown: the head, thorax, and body are gray-brown, the thorax strongly crested.

The EGGS are laid in July and August in clusters on the leaves of pear, plum, and very many other trees; I have always found them on the upper surface of the leaf, and also always in autumn, when the fruit has been ripe or ripening; they hatch in ten or twelve days, the young CATERPILLARS proceeding at once to devour the upper cuticle and parenchyma of the leaf, leaving the lower cuticle entire, dry and brown; they lie closely packed side by side, and apparently motionless, the only indication being that day after day, and hour after hour, the rank move gradually but surely onwards, leaving a larger brown space behind; in a few days, perhaps from ten to fifteen, they abandon this arboreal life, and descending scatter themselves over vegetables and living plants of all kinds, obligingly selecting dock where it can be found, but making perfectly free with lettuce and autumnal greens; in October the caterpillar begins to hybernate, concealing itself in gardens at the bottom of box-edging, or under the leaves of herbaceous plants lying on the ground, or under stones, or the leaves of docks. In the spring it feeds greedily, but always, I believe, on herbaceous plants, never ascending trees. The full-fed caterpillar has a shining head rather narrower than the second segment, and a smooth velvety body; it rolls in a ring on being annoyed; its colour is a dull pale brown, with a rather darker medio-dorsal, and a much darker lateral stripe; the latter has a blackish border above; a longitudinal series of oblique white lines intersects the lateral stripe. It changes to a CHRYSALIS beneath the surface of the ground.

The MOTH appears in June, and is common everywhere, so far as entomologists have explored. (The scientific name is *Nœnia typica.*)

Obs. Guenée, who has noticed in France the little companies of caterpillars of this insect, observes, "*La chenille se rencontre souvent par petits groupes dans le jeune age, au premier printemps.*" In England I have only seen these clusters in autumn.



710. The Old Lady (*Mania Maura*) Variety.



710. The Old Lady (*Mania Maura*).

710. THE OLD LADY.—The palpi are moderately long, the second joint being thickly clothed with scales, and slightly ascending; the terminal joint is directed straight forwards, and is slender, naked, and pointed; the antennæ are also simple: the fore wings are rather arched on the costa, slightly excavated at the tip, and decidedly scalloped on the hind margin; their colour is black-brown; the reniform and orbicular are very distinct, and are contained in a dark median band: the hind wings are black-brown, with an oblique median pale line; their hind margin is regularly scalloped: the head, thorax, and body are black-brown; the thorax and body are crested; all the wings have a marginal border slightly paler than the general area; this is particularly observable at the apical angle of the fore wings, and the anal angle of the hind wings: on the underside this border exactly resembles the pale border of *Vanessa Antiopa*.

The EGGS are laid on fruit trees, in the autumn, and the young CATERPILLARS hybernate early; they feed again in spring, as soon as the leaves expand, and are full-grown in May; the head is slightly porrected and rather small: the body is smooth and velvety, rather attenuated and leech-like anteriorly, but stouter from the seventh to the eleventh segment: the colour of the head and body is dingy umber-brown, with various darker and paler markings; the head is obscurely reticulated; the second, third, and fourth segments have an interrupted pale medio-dorsal stripe; in some specimens this may be indistinctly traced throughout every segment, except the thirteenth; on the back of each segment from the fifth to the twelfth, both inclusive, the brown colour is intensified in a lozenge-shaped mass; these lozenges are eight in number; the last is cut off posteriorly by a transverse black bar extending on each side to the spiracles: on the side of each segment, from the fifth to the twelfth inclusive, are a variety of paler and darker markings: the spiracles are reddish, with a black margin, and above each is a rather complicated marking, consisting principally of a pale oblique bar, bordered posteriorly by a dark brown or black oblique bar, and having a black marking united to it anteriorly; on the twelfth segment is a narrow black bar extending from spiracle to spiracle. I have found this caterpillar feeding on strawberry leaves, but this is, I think, uncommon.

The MOTH appears on the wing in July and August, and is fond of resorting to summer-houses, boat-houses, sheds, &c., in the interior of which it may frequently be observed in the day time, sitting on the inner surface of the roof: I once counted twenty-eight in a boat-house at Godalming. Mr. Reading says that a marked specimen has returned to the same house after being repeatedly ejected. (The scientific name is *Mania Maura*.)

Obs. It appears to me that Mr. Stephens wisely separated this species generically from the foregoing: both the insects figured were kindly lent me by Mr. Bond.



711. The Black Neck (*Toxocampa Pastinum*).

711. THE BLACK NECK.—The palpi are porrected, the second joint stout and moderately long, the terminal joint short, naked, and pointed; the antennæ are slightly ciliated; the fore wings are nearly straight on the costa, blunt at the tip, and waved on the hind margin; their colour is pale brownish-gray freckled with minute transverse short lines; the orbicular is represented by a brown dot; the reniform is dark velvety brown, with one or sometimes two short oblique lines of the same colour; the wing-rays are concolorous with the general area, but there is a transverse shade beyond the reniform slightly darker than the general area: the hind wings, face, thorax, and body are pale gray-brown; the crown of the head and collar are rich velvety brown.

The CATERPILLAR has a small, rather pointed and rather porrected head, a long and leech-like body considerably attenuated at the anterior extremity; the colour of the head is smoky-gray; the body has seven distinct stripes, all of them rather narrow; the mediodorsal is ochreous-yellow, the next on each side black, the next yellow, the next and last on each side plumbeous-gray, and including several black dots and spots; all these stripes are bordered with white; the ventral surface, legs, and claspers are very dark smoke-coloured, almost black. It feeds on the purple vetch (*Vicia cracca*).

The MOTH appears on the wing in June, and is by no means generally distributed in this country; it occurs in Cornwall, Devon, Somerset, Dorset, Hampshire, Sussex, Surrey, Kent, Essex, Norfolk, Suffolk, and Cambridgeshire, and has been reported from the lake district and Yorkshire. (The scientific name is *Toxocampa Pastinum*.)



712. The New Black Neck (*Toxocampa Craccæ*).

712. THE NEW BLACK NECK.—The palpi are porrected, the second joint being stout and moderately long, the third short, naked, and pointed: the antennæ are slightly ciliated: the fore wings are straight on the costa, blunt at the tip, and slightly waved on the hind margin; their colour is pale brownish-gray suffused with a purple tinge and freckled with minute transverse darker lines; the reniform is represented by a cluster of dark-brown spots; the orbicular is scarcely perceptible; there are four equidistant brown spots on the costa; there is a transverse shade beyond the reniform, and the wing-rays, which are very pale, are shown conspicuously in passing through this: the hind wings are pale gray-brown; the face and disk of the thorax and body are also pale gray-brown, but the crown of the head and the collar are dark rich velvety brown.

Mr. Buckler thus describes the CATERPILLAR: "When full grown it is an inch and a quarter to an inch and a half in length. When viewed from above it tapers towards the head, and still more towards the posterior end; but when seen sideways it appears almost uniformly long and slender. Its manner of crawling is a partial looping of the first six segments; the first two ventral claspers are very slightly shorter than the others, but to such an extent as to be scarcely noticeably so, and it generally assumes an undulating posture in repose along the stem of its food-plant. Along the back, commencing on its head, is a dark brown, very finely mottled broad stripe, widest along the middle segment, and with an additional widening on the eleventh segment; in the centre of this is a thin, rather pale stripe, enclosing the very dark brown dorsal line. The subdorsal stripes are double, brown, with

a paler ochreous-brown ground, followed by a pale stripe of ochreous, enclosing a very thin brown line; the lateral lines double, dark brown, extending from the mouth to the anal claspers; this is edged above with black at the anterior portion of each segment, the upper one widening below in the middle, along which are some black dots; the belly and legs are brown. Within the dark portion of the back, on each segment are placed four black dots in the usual order, and on the eleventh segment there is an additional black dot on each side, outside the dark region; subdorsal lines also, containing two black dots and a minute ring. It feeds on the wood vetch (*Vicia sylvatica*), and is full-fed about midsummer.

The MOTH appears on the wing in July, and has only occurred to entomologists in Devonshire, where it was discovered by the Rev. E. Horton. (The scientific name is *Toxocampa Craccæ*.)



713. The Anomalous (*Stilbia anomala*).

713. THE ANOMALOUS.—The palpi are short and distant, they are porrected, and the terminal joint is naked and porrected; the antennæ are slightly pubescent in the male, simple in the female: the fore wings are narrow, scarcely arched on the costa, and blunt at the tip; their colour is smoky gray and glossy; both the discoidal spots are clearly defined, and both are composed of the same tints, first a black circumscription, then a border of pale gray; within this a smoky median area, and within the median area a pale gray line; the position of the orbicular is very oblique, its shape very elongate; the hind wings are ample, much folded, of a pale pearly-gray colour, and very glossy; the head, thorax and body are gray-brown.

The CATERPILLAR, according to Graslin, is obese and of a greenish-yellow colour, with the medio-dorsal and subdorsal stripes slender and yellowish-white; the spiracular line is broad and bluish-white, attenuated at both extremities, and bordered above by a darker tint; the spiracles above are blacker, and the legs concolorous with the body; the head is pale reddish-green: it feeds entirely on grass in the open parts of woods. The CHRYSALIS is short and of a yellow-ochre colour, with a darker stripe down the back.

The MOTH appears on the wing in August and September and seems very local: in some localities in Cornwall and Devon it is abundant, but always confined to a small space: it has occurred in Hampshire, Dorsetshire, Sussex, Surrey, and Kent, it would seem that no entomologist has observed it in the midland counties of England, but it appears again in the north, having been taken in Cheshire and Lancashire; it has been found somewhat abundantly in Scotland, my series having been taken by the late James Foxcroft, at Kinloch Rannoch, and Mr. Birchall says it is not uncommon at Howth in Ireland. (The scientific name is *Stilbia anomala*.)



714. The Alchymist (*Catephia Alchymista*).

714. THE ALCHYMIST.—The palpi are rather long and curved upwards, the second joint is slender and bent, the third is slightly dilated at the extremity; the antennæ are delicately ciliated in the male, the ciliations white and the shaft of the antenna black; the fore wings are of moderate size and proportions; the outline of the costa is slightly arched both at the base and tip, but the middle portion of the costa is nearly straight; the hind margin is cut off obliquely, and decidedly but not deeply scalloped; their colour is almost black, but marbled and lined with still deeper black; there is an indication of the site where the reniform spot is usually placed;

there are two white spots on the costa near the tip, and the hind margin is occupied by a broad pale band, the inner margin of which is very irregular: the hind wings are smoky for a very small space at the very base, and along the inner margin there is a long somewhat triangular snow-white space occupying the basal portion of the wing to nearly one third of its area: this is followed by a very broad black band which is interrupted at the apical angle, and again at the anal angle, by a longish but narrow snow-white mark, which includes that portion of the fringe that adjoins it. The thorax is densely clothed with long erect scales, and the body is crested in both sexes; the colour of the head, thorax, and body is smoky black, the extremity of the body being slightly paler.

Guenée observes, that Esper's figure of the CATERPILLAR in no respects resembles it: he therefore describes it *de novo:* the colour is gray mixed with reddish; it has no distinct stripes, but the border of the second segment is bright yellow; the trapezoids are salient and of a yellow colour surrounded with black, those on the fifth and twelfth segments are elevated in a somewhat pyramidal form, notched at the summit, and crowned with a few hairs; a number of black dots are sprinkled without order amongst them; the ventral area is bluish-white, with a black spot on those segments which have no legs or claspers; the spiracles are yellow in black rings: it feeds on oak (*Quercus Robur*) in August, and when full fed spins a slight cocoon and therein changes to a stout CHRYSALIS the anal extremity of which is squarely truncate.

The MOTH appears on the wing in May: it occurs, although very rarely, in central and northern Europe, and a single specimen has been taken at sugar by Dr. Wallace in the Isle of Wight: this specimen is unique as British, in the rich cabinet of Mr. Bond, to whom I am indebted for the opportunity of figuring and describing it for this work. (The scientific name is *Catephia Alchymista.*)



715. The Clifden Nonpareil (*Catocala Fraxini*).

715. THE CLIFDEN NONPAREIL.—The palpi are porrected and slightly curved upwards, the terminal joint being slender, pointed, and almost naked; the antennæ are long and slender, pubescent in the male, and simple in the female: the fore wings are somewhat arched on the costa, the arch being gradual from the base to the tip; they are regularly scalloped on the hind margin; their colour is gray with various transverse and longitudinal darker markings; the reniform is distinct, the orbicular apparently absent; adjoining the reniform on its inner side is a pale-gray blotch without defined boundaries, and below the reniform is another pale blotch with well-defined boundaries; beyond the middle is an acutely zig-zag bar, its outer moiety pale gray, its inner moiety black: the hind wings are black, with a median blue-gray band, and a marginal white band, which is narrow and delicately bordered with a waved black line; the fringe is white; the head and thorax are mottled-gray; the body is smoky-black, with delicate blue-gray rings.

The CATERPILLAR rests with the ventral surface closely appressed to a branch or twig of the food-plant, and has no power of rolling in a ring, and does not fall off or relinquish its hold if annoyed, but seems to clasp the bark all the more firmly, and to defy all attempts at removal; the head is placed transversely, the position being prone and the face flattened; it is much broader than the second, third, or fourth segments; the body is convex above and flattened beneath, and appears to have fourteen segments, the one which is additional occurring after the thirteenth; the number of claspers is ten, situated, as usual, on the seventh, eighth, ninth, tenth, and terminal segments; after the fifth segment the body is gradually incrassated to the ninth segment, which has a dorsal lump, and the fifth and sixth segments have each a pair of small lobes in the ventral surface somewhat resembling false claspers, and along each side where the convex dorsal and flattened ventral surface meet, is a continuous series of pointed fleshy appendages mixed with hairs exactly similar to those I have described as possessed by *Metrocampa margaritata* at page 53: the use of these curious appendages no one has been able to detect; their resemblance to the rootlets of ivy is very striking, and the imitation of an ivy twig climbing on the branch of the ash is absolutely perfect: the colour is brownish-gray sprinkled with black; the underside is somewhat putty-coloured, with a large black spot on each segment: it feeds on ash (*Fraxinus excelsior*), the poplar, and is full-fed in July, when it spins a net-work of silk among the leaves, and in this changes to a smooth CHRYSALIS covered with a mealy powder or bloom of a bluish-gray colour.

The MOTH appears on the wing in August and September, and is always esteemed a great prize, and some supposed English specimens are sold by dealers at a very high price, a fact that holds out a perpetual premium to fraud. I strongly recommend entomologists never to buy an English specimen: if they desire to place an example of this beautiful insect in their cabinets, let them give a few pence for a French or German specimen, and, having labelled it with care, place it in its appointed station: it is an excess of folly to give two or three pounds for an insect just because it is supposed to be taken on the English instead of the French side of the Channel. This practice, however, prevails to so great an extent as to render it next to impossible to unravel the history of every reputed British specimen. Single specimens have been occasionally reported as captured in Somerset, Wilts, Dorset, Hants, Isle of Wight, Sussex, Surrey, Kent, Essex, Suffolk, Norfolk, Cambridge, Shropshire, Lancashire, and Yorkshire. (The scientific name is *Catocala Fraxini*.)



716. The Red Underwing (*Catocala nupta*).

716. THE RED UNDERWING.—The palpi are porrected and slightly curved upwards, the second joint being densely covered with scales, the terminal joint erect and nearly naked;

the antennæ are slightly pubescent in the male, simple in the female: the costal margin of the fore wings is nearly straight for about two-thirds of its length, and then curved very decidedly to the tip; the hind margin is scalloped, but not deeply so; their colour is dark gray tinged with ochreous and marbled with darker markings; the reniform is distinct and dark; the orbicular absent: the hind wings are red, with a narrow median, and broad hind-marginal black band; the hind-marginal fringe is white, the inner marginal fringe light brown; the head and thorax are marbled with the same colour as the fore wings; the body is gray-brown and glossy.

The CATERPILLAR has all the peculiarities of form described under *Catocala Fraxini:* the head is broader than the second, third, or fourth segment; the body is very flat below and convex above; its colour is ashy-gray, and has two irregular, interrupted, and waved dorsal stripes rather darker than the ground-colour, but these are sometimes absent; the ventral surface is glaucous, with a black spot on each segment: it feeds on the crack-willow (*Salix fragilis*), and when closely adherent to the bark is almost impossible to detect: I have sometimes found it by passing my hand gently over the surface of the bark about a foot below the branches of a pollard willow, when its cold, soft feel at once betrayed it. It spins a network cocoon among the leaves or in a crevice of the bark about midsummer, and changes to a smooth CHRYSALIS covered with purple bloom.

The MOTH appears on the wing in August and September, and has been taken in some abundance in all the southern and south-eastern counties of England. (The scientific name is *Catocala nupta.*)



717. The Dark Crimson Underwing (*Catocala sponsa*).

717. THE DARK CRIMSON UNDERWING.—The palpi are porrected and slightly curved upwards, the second joint densely covered with scales, the terminal joint erect and nearly naked; the antennæ are slightly pubescent in the male, simple in the female; the fore wings are nearly straight along the costal margin, but slightly arched towards the tip, and scalloped on the hind margin; their colour is a rich ochreous-gray with a decidedly ochreous patch in the region of the reniform, and including that spot, which is clearly defined; the orbicular is absent, but there is a distinct and bright ochreous spot immediately below the reniform, having a black circumscription: the general area is beautifully and richly marbled, the hind wings are crimson with a narrow but sharply-angled

median black band, and a broad hind-marginal black band: the head and thorax are marbled with the colours of the fore wings, the body is uniformly gray-brown.

The CATERPILLAR rests in a nearly straight position on the branches of the oaks, on the leaves of which it feeds, the ventral surface being appressed to the bark; the head is somewhat narrower than the second segment, but distinctly exserted; the face is flat and the crown gibbose and notched: the body is convex dorsally, and flattened ventrally; the ninth segment has a transverse dorsal ridge, the twelfth segment has also a ridge, but this terminates at each extremity in a lateral tubercle surmounted by a bristle; the fifth, sixth, seventh, eighth, tenth, and eleventh segments have each two wart-like tubercles placed transversely, each bearing a bristle; the claspers are long, dilated and divided at the extremity: the colour of the head is wainscot-brown, reticulated with darker brown, and having a conspicuous black band surrounding the face, except towards the mouth; within this, and very near the crown, are two eye-like black spots: the dorsal surface of the body is dull brown, reticulated with pale wainscot-brown; the tubercles, as well as certain minor warts, are rufous-brown, and very glabrous; there is a pale transverse dorsal mark on the fifth segment; the ventral surface is whitish, inclining to glaucous, with a rufous patch between each pair of ventral claspers. It is full-fed about the eighth of June, when it spins a thin web among the oak-leaves, without descending to the ground.

The MOTH appears on the wing in July, and has been found in Dorsetshire, Hampshire, Sussex, Surrey, Kent, and Essex. I have seen it, but not obtained it, sitting on the trunks of oaks in Darenth Wood, but the New Forest in Hampshire is its most abundant locality. (The scientific name is *Catocala sponsa*.)



718. The Light Crimson Underwing (*Catocala promissa*)

718. The Light Crimson Underwing.—The palpi are porrected and slightly curved upwards, the terminal joint being slender, almost naked and pointed, the costal margin is nearly straight but slightly bent at the tip, and scalloped on the hind margin; their colour is gray, mottled and marbled with darker gray, and having not unfrequently a tinge of ochreous; the reniform is readily to be made out, but not situated in an ochreous patch as in *Sponsa:* the hind wings are crimson with a narrow median band, which is very slightly waved, and is turned towards the body at its lower extremity; there is also a broad hind-marginal black band and a gray fringe; the head and thorax have the colours of the fore wings, the body is uniformly gray-brown.

The full-grown caterpillar is figured by Hubner: it rests stretched at full length on a tree, or trunk of its food-plant; the head is prone, and broader and larger than the second segment; it is scarcely notched on the crown: the body is very much attenuated at the anterior extremity, and the posterior portion is large and inflated, each segment being smaller in the middle, and the anal claspers extending backwards and being widely separated; the colour of the head and body is greenish-gray with sundry black marks on the dorsal surface of every segment; there are no two segments in which the black markings are similar, but all of them are distinct and most clearly defined; on the eighth segment these assume the appearance of two capital letters X X. The ventral area is flattened, and there is a fringe of bristles mixed with fleshy threads extending the entire length of the body, at the junction of the dorsal and ventral areas; the ventral surface and claspers are pale green. The chrysalis is slender, obtuse at the head, and gradually tapering towards the anal extremity, which is acutely pointed: its whole surface is covered with a delicate purple bloom like that on a ripe Orleans plum.

The moth appears on the wing in August, and has been taken in the New Forest, Hampshire, in Sussex, and in Berkshire. The scientific name is *Catocala promissa.*)



719. The Lunar Double Stripe (*Ophiodes lunaris*).

719. The Lunar Double Stripe.—The palpi are porrected and rather distant, the second joint slightly ascending, very long, and densely clothed with short scales; the terminal joint is scarcely so long as the second: it is directed straight forwards, slender, and pointed; the antennæ are slightly serrated in the male, simple in the female; the fore wings are ample, the costal margin somewhat arched, the tip blunt, the hind margin waved, and the wing-rays prominent; their colour is pale dingy-brown; the orbicular is a small dark spot; the reniform has a distinct dark circumscription, and a median area corresponding with the general area of the wing; there are two narrow transverse lines rather paler than the ground-colour; the first of these is situated before the orbicular; it is oblique, the costal extremity being rather nearer the base of the wing than the inner marginal extremity; the second is situated beyond the reniform, and is bent both above the middle and at the lower extremity, where the bend is almost close to the inner margin, when it suddenly turns towards the base of the wing and follows the hind margin until it meets the first transverse line; the broad hind-marginal area is darker than the median and basal areas, and is intersected by an indistinct waved line: the

hind wings, head, thorax, and body are concolorous with the fore wings.

The CATERPILLAR is beautifully figured by Sepp: it has the head porrected, flattened, not notched on the crown, and rather narrower than the second segment; the body is rather long and leech-like, and tapers slightly towards the anal extremity; it is arched in crawling like the Geometers, the first pair of claspers being raised and relaxing their hold on the food-plant; there is a small excrescence on each side of the fifth segment, and there are two dorsal papillæ on the twelfth, and two smaller ones on the thirteenth segment; the anal claspers are long, slender, protruded backwards, and spreading; the colour of the head is light brown or greenish-brown, with two darker or reddish-brown streaks down the face, but united by a band above the mouth: the body is bistre-brown, with a very narrow chain-like stripe containing, as it were, two beads in each segment; on each side of this is a broader stripe very dark-coloured, but intersected throughout by a chain of pale spots; below this broader stripe are three line-like stripes extending the entire length of the insect.

Some specimens have a pale-yellow stripe in the region of the spiracles. It feeds on oak (*Quercus Robur*).

The MOTH appears on the wing in May. A specimen was taken in Hampshire by Captain Chawner, another at West Wickham, in Surrey, by Mr. Smith, and two at Killarney, in Ireland, by the late Peter Bouchard. (The scientific name is *Ophiodes lunaris*.)



720. The Mother Shipton (*Euclidia Mi*).

720. THE MOTHER SHIPTON.—The palpi are short and curved upwards, the second joint dotted with bristly scales, the terminal joint naked; the antennæ are slightly pubescent in the male, simple in the female: the fore wings are slightly hollowed along the costa until near the tip, then slightly arched; their colour is sepia-brown with several dirty white lines; the orbicular is a round black spot, the reniform an oblique black spot, the space between them being pale; beyond the reniform is a short transverse whitish line, which may be supposed to mark its outer border; beyond this is a curiously contorted white line: it begins on the costa and descends nearly to the anal angle, then turns upwards towards the reniform, but before touching, it again descends to the inner margin, where it is again bent, and finally ascends to the costa near its base: the hind wings are sepia-brown, with numerous pale spots, a series of which form an irregular transverse band; the head, thorax, and body are sepia-brown, the last with delicate white rings.

The CATERPILLAR is figured by Hubner: it rests with the anterior extremity elevated and the back slightly arched: the head is about equal in width to the second segment; it is semi-prone, and not conspicuously notched on the crown: the body is slender and almost uniformly cylindrical, but tapers towards the posterior extremity; there are but two pairs of ventral claspers, and these are situated on the ninth and tenth segments; the anal claspers are rather long and spreading; the colour of the head and body is pale gray approaching to putty-coloured; the head has a longitudinal stripe down the middle of the face; the body has four whitish stripes extending from the head to the anal claspers, all of them having a delicate black margin; the legs and claspers are of the same colour as the body; it feeds on the common melilot trefoil and changes to a smooth CHRYSALIS of a bright red-brown colour, and having six or eight sharp anal points.

The MOTH appears on the wing in June, and occurs almost everywhere in England, Scotland, and Ireland. (The scientific name is *Euclidia Mi*.)



721. The Burnet Noctua (*Euclidia glyphica*).

721. THE BURNET NOCTUA.—The palpi are short and curved upwards, the second joint being clothed with bristly scales; the terminal joints are short and naked; the antennæ are simple: the fore wings are nearly straight along the costa and slightly arched towards the tip; their colour is ochreous-brown, in recent specimens glossed with purple; the reniform is represented by an obscure and ill-defined cloud; the orbicular is indistinguishable, the broad hind-marginal area is paler and contains a large and distinct square costal blotch of very dark brown: the hind wings are smoky-brown at the base, and dull orange towards the hind margin; the orange-coloured area is intersected by a waved brown bar, and an irregular hind-marginal band; the head, thorax, and body are dark gray-brown.

The CATERPILLAR is figured by Hubner: it rests with the anterior extremity elevated, and the back slightly arched; the head is about equal in width to the second segment; it is semi-prone and not conspicuously notched on the crown; the body is slender and almost uniformly cylindrical, but tapers towards the anal extremity; there are but two pairs of ventral claspers, and these are on the ninth and tenth segments: the anal claspers are rather long and spreading. The colour of the head is brown with a V-shaped white mark on the face; the dorsal area of the body is pale wainscot-brown with four paler stripes extending from the head to the anal claspers; all these are bordered by a delicate black line, and those on each side are intersected by a similar line: the ventral is much darker than the dorsal area; the legs and claspers are concolorous with the former. It feeds on Dutch clover (*Trifolium repens*) and turns to a CHRYSALIS, which is of a delicate violet colour, and has six or eight short anal points.

The MOTH appears on the wing in June, and occurs almost everywhere in England, Scotland, and Ireland. (The scientific name is *Euclidia glyphica*.)



722. The Small Purple-barred (*Phytometra ænea*).

722. THE SMALL PURPLE-BARRED.—The palpi are long, recurved, ascending and laterally compressed; the second joint is flat and densely scaly, the terminal slender and pointed; the antennæ are short and simple in both sexes; the fore wings have the costa very straight, their colour is olive-green, with the costal margin and two oblique bands of a delicate rosy-purple colour; the first of these is median, the second (the broader one) hind-marginal; the hind wings are olive-brown, the hind margin slightly tinged with purple; the head, thorax, and body are of the same colour as the hind wings. All the wings in some specimens are dingy olive-brown.

The CATERPILLAR feeds on the common milkwort (*Polygala vulgaris*), and has been described by the Rev. John Hellins: its colour is a velvety full green, scarcely paler on the belly; the head mottled with faint brown; a hasty inspection would scarcely detect any lines, but on looking closely, the dorsal vessel appears as a darker green thread, bordered with paler lines, between which and the spiracles come three pale sub-dorsal lines, the spiracles yellowish; below them a broader pale line, which on segments ten to thirteen becomes whitish. The segmental folds yellow, the usual dots very small, black, surrounded with light rings, and emitting small bristles. When full-fed their walk is semi-looping, and they rest extended straight and flat on the stems of their food-plant; if disturbed they drop off, and fling themselves about angrily.

About the 10th of September they begin to contract in length and to grow pale, and in a day or two spin themselves up in very tight-fitting little cocoons of close-woven gray silk, wrapped about with some of the leaves and stems of their food.

The MOTH appears on the wing in June and July, and occurs occasionally almost everywhere in England, Scotland, and Ireland. (The scientific name is *Phytometra ænea.*)

SUPPLEMENT.

During the progress of this work through the press, seven additional species of moth have been discovered in Britain, and have been fully described in the *Entomologist* or *Insect-Hunters' Year-book*, periodicals instituted for the express purpose of preserving a record of every discovery and observation made in British Entomology. These are now re-described in this Supplement, and an unfortunate transposition of two of the figures is also pointed out and rectified.



23*. The Thrift Clearwing (*Sesia Philanthiformis*).

23*. The Thrift Clearwing.—The palpi are distant, porrected, and very sharp-pointed, the second joint is clothed with long scales, the terminal joint is naked; the fore wings are long and narrow, their colour is black, with two transparent spots, the first an elongate triangle reaching from the base to the middle of the wing, the second roundish and beyond the middle; this second spot is traversed by three longitudinal wing-rays, and beyond this second transparent spot is a yellowish blotch also traversed by three longitudinal wing-rays, which are black but rather indistinct; hind wings transparent, with a black discoidal spot, rays and fringe; the palpi are of two colours—black and gray; in the female the gray predominates; the terminal joint is naked, its colour is gray at the base and black at the tip; the antennæ are black, with a slight indication of a gray ring near the tip; the face is silvery white, the crown of the head and eyes black, the collar is orange in front, black behind; the thorax is black, with three longitudinal, pale yellow lines; the body is black, with a medio-dorsal series of gray spots and several narrow whitish belts; these are usually three in the male and four in the female; the caudal tuft is black, largely interspersed with pale yellow scales, which in the males occupy the sides, in the females the middle; the legs are alternately dull black and gray.

The caterpillar has a small shining brownish head and a whitish maggot-like body; it feeds in the interior of clumps of thrift (*Statice armeria*), selecting by preference those which are isolated and starved, and is very rarely found where the thrift is luxuriant and the plants approximate: its presence may readily be detected by the dried and dying appearance of the centre of the tuft: when full-fed, it changes to a chrysalis in the heart of its food-plant; the chrysalis is pale brown and very shining, and each segment has two transverse rows of rather sharp-pointed dorsal warts directed backwards; the warts in the first row are more than double the size of those in the second row.

The moth appears on the wing about Midsummer, and is common at Torquay in Devonshire, in the Isle of Man, and probably

wherever the thrift abounds. (The scientific name is *Sesia Philanthiformis.*)



40*. The Cistus Forester (*Procris Geryon*).

40*. THE CISTUS FORESTER.—The antennæ are slightly incrassated towards the tip in both sexes; those of the male are serrated, those of the female simple: the colour of the fore wings is shining green; the hind wings are smoky-black and transparent; the head, thorax, and body are golden green.

The EGGS, which are of a pale yellow colour, are laid at the beginning of July in confinement, and are scattered at intervals in the box or cage in which the imago has been kept; the young CATERPILLARS emerge in a few days; the full-fed caterpillars were found in April by the Rev. E. Horton, to whom I am indebted for a supply: they were feeding on the common sun cistus (*Helianthemum vulgare*), on the Malvern Hills; and the fact of their feeding in July, and again in April, leads to the conclusion that they hybernate. Unable to supply my caterpillars with their proper food-plant, I gave them sorrel (*Rumex acetosella*), on which they fed freely and arrived at maturity; but Mr. Horton informs me that although he offered them the sorrel they would not touch it while the supply of cistus lasted. The full-fed caterpillar, when disturbed, falls off its food-plant, and lies on its side in a crescentic form, the two extremities approaching but not touching. The head is very small, and entirely retractile within the second segment; the body is obese, almost oniscitorm, gradually decreasing in size towards both extremities; the incisions between the segments are well marked, the segments being distinctly divided; on each segment are six warts, none of them conspicuous, but each emitting a thin fascicle of short radiating bristles, among which are interspersed a few longer silky hairs: every part of the dorsal surface, the warts alone excepted, is covered with minute papilliform black dots. The head is black and shining; the second segment dingy yellow in front, black and rather shining on the disk, and purplish flesh-coloured beneath; the mediodorsal stripe is dingy white, narrowly bordered with very dark reddish-purple; exterior to these narrow borders is a broad dingy yellow stripe on each side, swelling on each segment into a rounded lobe; the sinuous exterior margin of the yellow stripes is bordered with black, which is gradually shaded off into reddish-purple in the spiracular region; the belly and claspers are dingy flesh-colour; the legs black. The caterpillars were full-fed early in May, and spun a thin white silken cocoon among the leaves of the food-plant, in which they turned to CHRYSALIDS, which were brown, smooth, and obese, the anterior extremity acute, the posterior remarkably obtuse; the dorsal surface incised at the segments as in the caterpillar, and the posterior margin of each projecting over the anterior margin of the next; the wing-cases are ample and clearly defined; the leg-cases extending to the extremity of the body; the colour is brown, with longitudinal series of darker dots, those in the middle approximate, the others more distant.

The MOTH appears on the wing in May and June, and is common in certain localities in Sussex, Surrey, Herefordshire, Yorkshire, &c. (The scientific name is *Procris Geryon.*)

Obs.—I announced this as a new British species in 1863, Mr. Doubleday having identified it with the *Procris Geryon* of Hubner. It differs from *Procris Statices*, in the males and females being of the same size, whereas in that species the males are much larger: the colour of the two is very similar; the caterpillars are different, and the food-plant totally so, that of the common Forester being the sorrel (*Rumex acetosella*).



45*. The Handmaid (*Naclia Ancilla*).

45*. THE HANDMAID.—The palpi are slender and distinctly porrected; the antennæ are strictly setaceous and of a dark brown colour; the eyes prominent and intensely black. The fore wings are ample; their colour is ochraceous semi-transparent brown, with four nearly circular white spots on each: two of these are closely approximate, placed transversely, and equidistant from the costa and anal angle, but slightly nearer the hind margin; the others are much smaller, and equidistant from the uppermost of the two spots already described and the costa: the hind wings are smaller, unspotted, and slightly darker than the fore wings; the crown of the head, collar, shoulders, and body are rich ochreous-yellow; the last has a medio-dorsal series of six black spots. In general appearance and habit it closely resembls a *Lithosia*.

The CATERPILLAR rests on epidendric lichens, on which it feeds, in any position suited to its shape. The head is quite as wide as the second segment; the body is slightly depressed and warty, each wart emitting a fascicle of radiating black hairs. The colour of the head is black, of the body black, with five yellow stripes, the broadest medio-dorsal and bright yellow, very conspicuous, the others lateral, narrow, and very pale: its appearance altogether is that of a *Lithosia* caterpillar. When full-fed it spins a white silken cocoon, and therein changes to a CHRYSALIS.

The MOTH appears on the wing in June. Mr. Wildman possesses the only British specimen yet obtained: he took it near the seacoast of Sussex, and has kindly placed it in my hands for description and figuring in this work. (The scientific name is *Naclia Ancilla*.)



58*. The Hoary Footman (*Lithosia caniola*).

58*. THE HOARY FOOTMAN.—The fore wings are silky and whitish-gray, with a very slender yellow costal margin and a narrow whitish stripe below the costal margin, and adjoining it: the hind wings are very pale gray: the head is yellow, the eyes intensely black, the collar very bright yellow: the thorax and body dove-colour.

The female lays her EGGS in August, on the Dutch clover (*Trifolium repens*), the Bird's-foot trefoil (*Lotus corniculatus*), and other *Leguminosæ*, on the leaves of which the CATERPILLAR feeds. The young caterpillars emerge in about ten days, and are then of a pale yellowish colour, semi-transparent, and bristling all over with hairs: they feed for about six weeks, changing their skins four or five times before they hybernate, eating very little, growing very slowly, and not attaining a length of more than a third of an inch; about the middle or end of September they retire towards the roots of the herbage, and spinning a very slight web, remain concealed during the winter; in the spring they re-ascend the food-plant, feeding principally by night, and in damp weather retreating under stones by day, but when the weather is warm and the sun bright they mount on every exposed stone and bask in its rays. The process of changing the skin again goes on, and really seems the chief occupation of life: nor can I say that the number of moultings is by any means constant; four or five changes seem to be the allowance for the autumn, and from five to eight for the vernal moulting: at each moulting they seem to lose almost all they had previously gained, crawling to the top of their cage considerably increased in size, and coming down again most disappointingly small: they seem to grow alternately larger and smaller. These caterpillars are

full-fed on or about the 15th of June, and then roll in a ring and fall off their food-plant if touched or annoyed: it is stony ground where they principally occur, and a small shell—a species of *Planorbis ?*—abounds in the same locality, and has almost exactly the appearance, in form, colour, and size, of a rolled-up *Caniola* caterpillar, a circumstance which greatly increases the difficulty of finding them when thus feigning death. In confinement, as at large, they feed exclusively on *Leguminosæ*, and seek no change of diet, pertinaciously refusing to touch, and indeed appearing to avoid, the lichens that my solicitude for their well-being had provided. The head is narrower than the body; when perfectly at rest, it is partially concealed by the second segment. The body is of nearly uniform thickness, but slightly decreasing towards the anal extremity; the segmental divisions are deeply incised; the second segment has the dorsal surface scabrous behind the head, the scabrous part emitting bristles which project over the head; this segment has also two scabrous warts on each side; the other segments have twelve scabrous warts, that is, six on each side, and each wart emits a fascicle of radiating bristles; four of these warts are strictly dorsal; two anterior smaller and approximate; two posterior, larger and more distant; the third on each side is large and circular; the fourth smaller and linear; and the fifth much smaller, and immediately above the claspers when these occur. The colour of the head is black and shining; there is a white spot on each side at the base of the mandibles. The body has a very narrow black medio-dorsal stripe, bounded on each side by a still narrower and very sinuous gray stripe; this is followed by a somewhat broader smoky-black stripe, and this, again, by a sinuous and irregular orange stripe; this last contains, and is interrupted by, the second row of scabrous warts; next on each side follows a broad stripe of smoky-black, delicately tessellated with sinuous gray markings; this lateral stripe contains the third series of warts, and also the spiracles, which are pale orange; finally comes a narrow sub-spiracular stripe of a dingy orange-colour, and this contains a fourth series of warts. The ventral surface is smoky flesh-colour; the legs and claspers rather less dingy. On or about the 8th of July it spins a slight cocoon at the roots of the clover, and changes to a smooth brown CHRYSALIS.

The MOTH appears on the wing in August, and has been taken at Torquay, and more abundantly in the county Dublin, in Ireland, by Mr. Birchall, to whose unremitting kindness I am indebted for a most abundant supply, both of the perfect insect and caterpillar, as also for the interesting details of its life-history given above. (The scientific name is *Lithosia caniola.*)

Obs. 1.—The males assemble freely, after the manner of *Bombyces*, to seek the company of the females.

Obs. 2.—Mr. Doubleday, with his usual acumen, discovered this species in a collection of insects brought by Mr. G. King from Torquay.



59*. The Leaden Footman (*Lithosia molybdeola*).

59*. THE LEADEN FOOTMAN.—"Is intermediate between *L. complana* and *L. plumbeola;* it has the figure of the former, the colour of the latter, and is rather more shining than either. It may be distinguished from *L. complana* by its darker hue, and in having the yellow costal stripe straighter, and terminating in a point before arriving at the apex as in *L. plumbeola;* the hind wings are always strongly tinged with gray along the inner margin, this colour even extending, in some specimens, over the whole surface, and leaving none of the usual ochreous colour visible, except a tolerably broad border, which forms a notch between the median and internal nervures: the head and neck are of a very bright yellow; the thorax and abdomen lead-coloured, this last not exhibiting any yellow except at

the extremity, and the yellow even here is generally mixed with gray. The female especially has scarcely any yellow at the anus; it is of the size of the male, or smaller. This species may be still more readily distinguished from *L. plumbeola* by the form of the wings, which altogether resemble those of *L. comptana;* the gray is equally shining, the costal band straighter and more distinct, the cilia tinged with gray, the neck unicolorous, the hind wings lead-coloured, but especially by the presence of the scaly fold of the costa of the fore wings."—*Guenée in Zool. for* 1863.

The MOTH appears on the wing in July, and has only been observed in Cheshire and Lancashire. It inhabits low and marshy places, and its CATERPILLAR in all probability feeds on the lichens which grow on the stems of the heath, or which carpet the stones that are scattered over the surface of the ground. (The scientific name is *Lithosia molybdeola.*)



438*. The White-point (*Leucania Albipuncta*).

438*. THE WHITE-POINT.—The palpi are slighty porrected and very inconspicuous, the minute terminal joint scarcely extending beyond the second joint; the antennæ are almost simple in both sexes; the fore wings are nearly straight on the costa and obtuse, but not rounded at the tip; their colour is brick-dust red, with a perfectly white spot at the lower extremity of the reniform, which would otherwise escape notice. This species closely resembles *Leucania lithargyria*, but Guenée thus differentiates them:—*Lithargyria*, confounded by many authors with *Albipuncta*, is distinguished from that species by its larger size, by the fore wings being less ferruginous, by the white spot amalgamating with a pale lunule situated above it, and, thus united, constituting the reniform, by the elbowed line being less conspicuous, and on the other hand by the transverse series of dots being much more so.

The MOTH appears on the wing in August. A single specimen, captured at Folkestone on the 15th of that month, at sugar, by Mr. Briggs, was exhibited at the meeting of the Entomological Society on the 2nd of November: a second specimen, much worn, was taken in the second week in October, within five yards of the same place. Mr. Allis has a third specimen, which he obtained from one of the Yaxley collectors. (The scientific name is *Leucania Albipuncta.*)



613*. The Viper's Bugloss (*Dianthœcia Echii*).

613*. THE VIPER'S BUGLOSS.—The palpi are slightly porrected, the terminal joint very small, and appearing as a little button amidst the scales of the second; the antennæ are nearly simple in both sexes; the fore wings are nearly straight on the costa, rounded at the tip, and perfectly simple on the hind margin; their colour is ochreous, beautifully marked and marbled with darker and lighter colours, some of the darker approaching umber-brown, some of the latter being almost white; the orbicular spot is well defined, white, with a slight central ochreous shade; the reniform is less perfect, its median area of a darker tint; there is a short transverse dark mark near the base, a waved dark line before the orbicular, a bent and zigzag dark line beyond the reniform, and finally a compound and zigzag transverse line parallel with the hind margin; the inner portion of this last is dark, the other white; the hind margin itself is occupied by a delicate fawn-coloured band; the fringe is brown, interrupted with seven white streaks; there are moreover four pale undefined clouds, the first near the base of the

wing, but exterior to the first short transverse line; the second on the costal margin, nearly above the orbicular; the third near the inner margin and towards the anal angle, and the fourth towards the apical angle and within the compound transverse line.

The CATERPILLAR feeds on the Viper's Bugloss (*Echium vulyare*), and also, according to Guenée, on the flowers of *Gypsophi'a paniculata*, which grows on stony hills near Vienna, but has not been found in England.

The MOTH appears on the wing in June. The only known British specimen was taken by the Rev. A. H. Wratislaw, at rest, on a plant of *Echium vulgare*, as recorded in the *Entomologist*, vol. iv. p. 214. (The scientific name is *Dianthœcia Echii*.)

This beautiful species stands at the head of the genus *Dianthœcia*, and next to *Ilarus ochroleuca*, which in colour, as well as the distribution of markings, it closely resembles.

692. The Small Marbled.

The words at the end, which stand thus, must be erased:—"I incline to refer both insects to the *Phytometra minuta* of Haworth." I learn from Mr. Doubleday that the species in question is North American, and is the *Acontia candefacta* of authors.

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